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COAL RESOURCES OF INDIANA COUNTY, PENNSYLVANIA


PART 1. COAL CROP LINES, MINED-OUT AREAS, AND STRUCTURE CONTOURS

William A. Bragonier
Albert D. Glover



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COAL RESOURCES OF INDIANA COUNTY, PENNSYLVANIA

PART 1. COAL CROP LINES, MINED-OUT AREAS, AND STRUCTURE CONTOURS

by **William A. Bragonier**

Rochester and Pittsburgh Coal Company

Albert D. Glover

Pennsylvania Geological Survey

PENNSYLVANIA GEOLOGICAL SURVEY

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COAL RESOURCES OF INDIANA COUNTY, PENNSYLVANIA

PART 1. COAL CROP LINES, MINED-OUT AREAS, AND STRUCTURE CONTOURS

by
William A. Bragonier¹ and Albert D. Glover²

INTRODUCTION

An objective of the Pennsylvania Bureau of Topographic and Geologic Survey is to provide accurate, timely information on Pennsylvania's bituminous coal. To achieve this goal, the Bureau cooperates with the U.S. Geological Survey to augment the National Coal Resources Data System (NCRDS). NCRDS is a computerized coal database developed by the U.S. Geological Survey to facilitate coal-resource calculations for the nation on a county-by-county and seam-by-seam basis, and to produce various kinds of tables and maps of coal characteristics.

Before NCRDS can be used for a particular bituminous-coal-producing county, all available data on the coal must be encoded and entered into the computer database. These data include site-specific (point-location) stratigraphic measurements and coal analyses, and specific map elements compiled on 7.5-minute topographic quadrangle maps. The map elements, which include coal outcrop lines, structure contours, and mined-out areas, are digitized and stored in the system for subsequent computer manipulations. It is important to recognize that this coal spatial data is three dimensional.

The maps in this report represent Part 1 of NCRDS for Indiana County. Part 2 will include the various computer-generated tables and maps of coal characteristics for the state. As the database for each county is completed and the derivative tables and maps of coal quality are produced, their availability will be publicly announced.

Inasmuch as the maps showing coal outcrop lines and mined-out areas are in constant demand by many users, including the coal industry, consultants, planners, government personnel, and academicians, they

are being made available through this publication in advance of Part 2 reports. These maps will be of considerable help in exploration programs, land acquisition, land use planning, and environmental protection.

Two kinds of maps may be included for each 7.5-minute quadrangle covering Indiana County (Figure 1). First, for each of the principal coal seams in a given quadrangle, there may be a map showing (1) the coal outcrop (crop line), and (2) the extent of all known strip and deep mining. If a principal coal has not been mined, a separate map for that coal is not shown. In quadrangles where there is an individual map of a coal seam containing an abandoned deep mine of unknown areal extent, only the opening of the abandoned deep mine is shown on that map. Second, for each quadrangle, there is a composite map showing the crop lines of all the principal coal seams (Figure 2), structure contours, and fold axes. Three separate datums were used to construct the structure contours: (1) the base of the Upper Freeport coal; (2) the base of the Lower Freeport coal; and (3) the base of the Lower Kittanning coal. The datum used for a particular quadrangle represents the geologic horizon for which the most accurate structural control could be established.

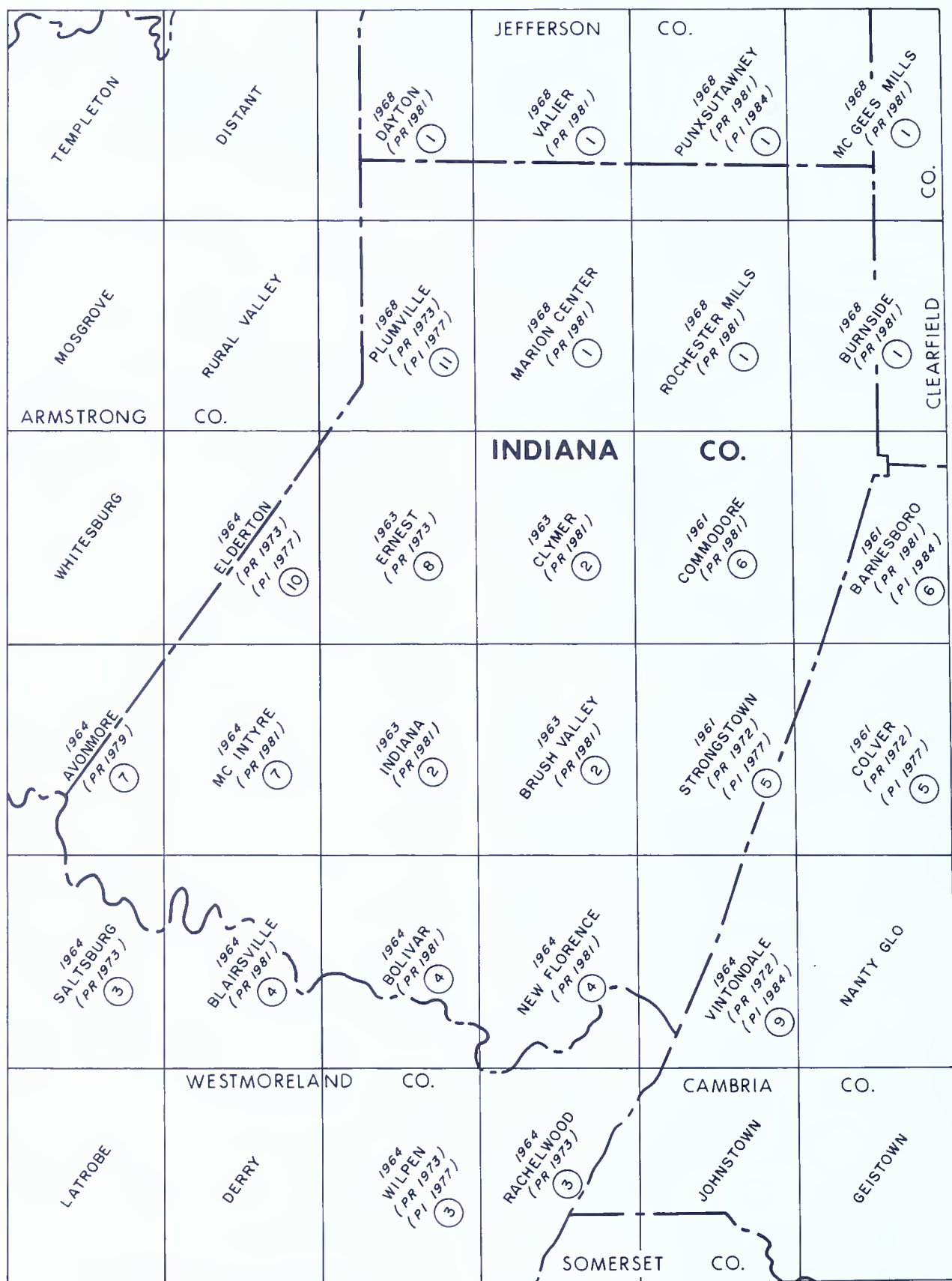
All of the maps contain information on sources of data, map reliability, and map symbols. In addition, the composite maps contain information on structure-contour intervals and datums, and names of fold axes. The general layout of the compilation maps is shown in Figure 3.

The map reliability terms given in this report should be used only as a general guide. The reliability terms for coal crop lines and structure contour lines are defined according to the approximate accuracy of the vertical placement of these lines: very good, ± 10 feet; good, ± 20 feet; and fair, ± 30 feet.

The structure contours, coal crop lines, and extent of deep mining for each quadrangle are based on maps compiled by William A. Bragonier and pur-

¹Rochester and Pittsburgh Coal Company, 655 Church Street, Indiana, PA 15701.

²Pennsylvania Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey, P. O. Box 8453, Harrisburg, PA 17105-8453.



Based on aerial photography taken:

- | | | |
|------------------|-------------------------|------------------|
| ① 1967 and 1977. | ⑤ 1958 and 1972. | ⑨ 1962 and 1972. |
| ② 1961 and 1977. | ⑥ 1958 and 1977. | ⑩ 1963 and 1973. |
| ③ 1962 and 1973. | ⑦ 1962, 1963, and 1977. | ⑪ 1967 and 1973. |
| ④ 1962 and 1977. | ⑧ 1961 and 1973. | |

Figure 1. Index map of 7.5-minute quadrangles in Indiana County. Dates of publication of topographic quadrangle maps are shown in italic type. Dates of photorevision (PR) and photoinspection (PI) are shown in parentheses.

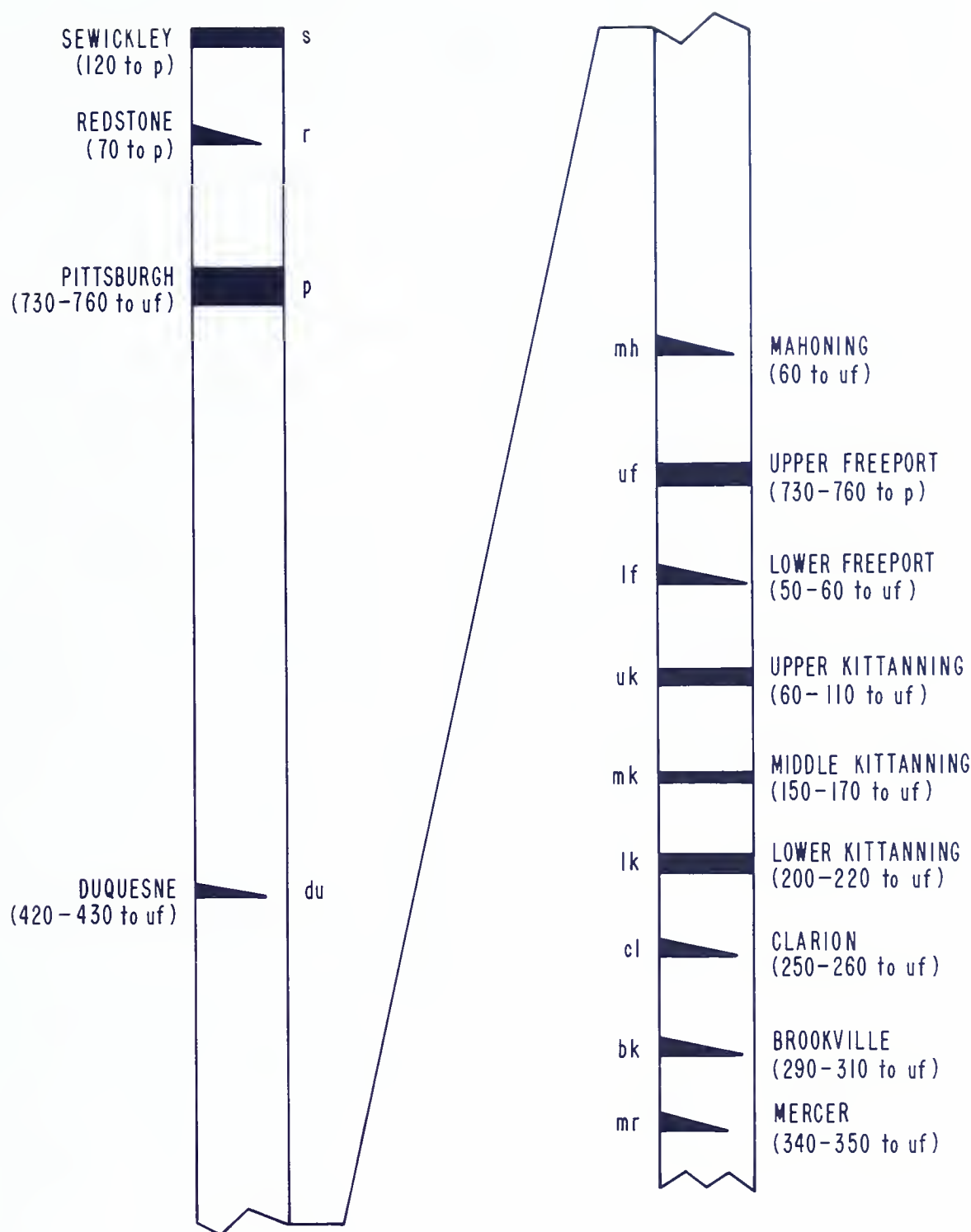


Figure 2. Stratigraphic position of the principal coal seams in Indiana County. The intervals, in feet, to either the Pittsburgh (p) or Upper Freeport (uf) coal are given in parentheses. Thicknesses of coal seams are not to scale.

chased by the Bureau of Topographic and Geologic Survey in 1986 from the Rochester and Pittsburgh Coal Company. Subsequent modifications to some of these maps, and the plotting of the strip mines, were done by Albert D. Glover in 1987 and 1988. The mined-out areas within the active deep mines have been updated to 1991. Strip mines were plotted using the most recent topographic maps, so the accuracy of these mines

depends upon the publication and photorevision dates of each topographic map (Figure 2).

The reader is advised that all of the original compilation maps are available for public inspection at the offices of the Pennsylvania Geological Survey in Harrisburg. The scale of the original maps is 1:24,000.

The reference list given at the end of this section can be used to locate additional information on

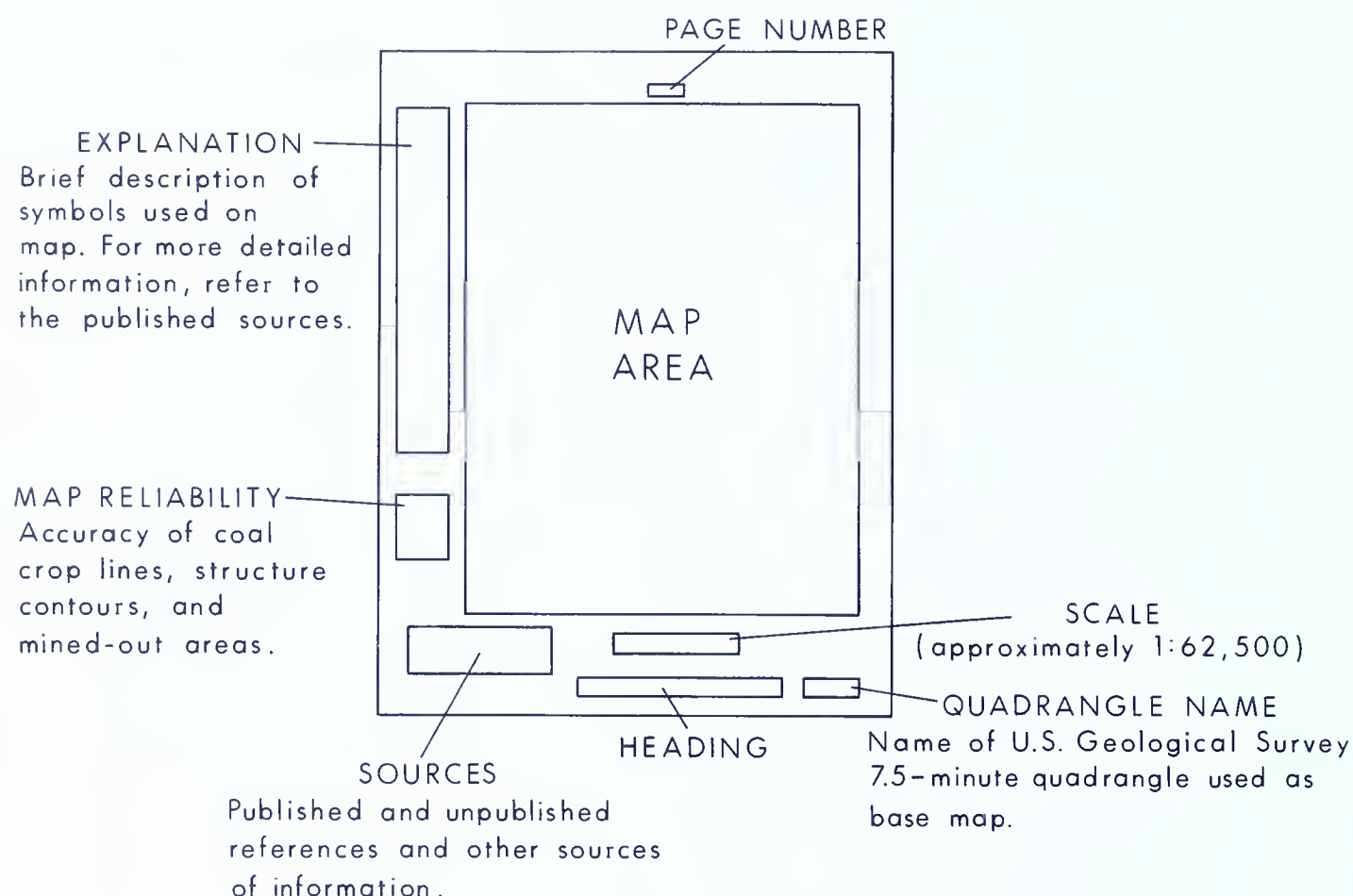


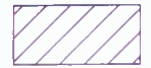
Figure 3. Guide to layout of compilation maps.

the geology of Indiana County and the quality of coal in the county.

REFERENCES

- Ashley, G. H., 1926, Geology and mineral resources of the Punxsutawney quadrangle, Pennsylvania: Pennsylvania Geological Survey, 4th ser., Atlas 65, 145 p.
- Campbell, M. R., 1904, Latrobe folio, Pennsylvania: U.S. Geological Survey Geologic Atlas of the U.S., Folio 110, 15 p.
- Campbell, M. R., Clapp, F. G., and Butts, Charles, 1913, Barnesboro-Patton folio, Pennsylvania: U.S. Geological Survey Geologic Atlas of the U.S., Folio 189, 13 p.
- Crentz, W. L., Steele, Fern, and Bailey, A. L., 1951, Preparation characteristics of coal occurring in Indiana County, Pa.: U.S. Bureau of Mines Report of Investigations 4763, 33 p.
- Dowd, J. J., Turnbull, L. A., Toenges, A. L., and others, 1950, Estimate of known recoverable reserves of coking coal in Indiana County, Pa.: U.S. Bureau of Mines Report of Investigations 4757, 22 p.
- Peck, F. B., and Ashley, G. H., 1906, The Punxsutawney and Glen Campbell coal fields of Indiana and Jefferson Counties, Pa., in Emmons, S. F., and Eckel, E. C., geologists in charge, Contributions to economic geology, 1905: U.S. Geological Survey Bulletin 285, p. 276-279.
- Phalen, W. C., 1910, Johnstown folio, Pennsylvania: U.S. Geological Survey Geologic Atlas of the U.S., Folio 174, 16 p.
- Puglio, D. G., and Iannacchione, A. T., 1979, Geology, mining, and methane content of the Freeport and Kittanning coalbeds in Indiana and surrounding counties, Pa.: U.S. Bureau of Mines Report of Investigations 8406, 35 p.
- Richardson, G. B., 1904, Indiana folio, Pennsylvania: U.S. Geological Survey Geologic Atlas of the U.S., Folio 102, 7 p.
- Shaffner, M. N., 1946, Geology and mineral resources of the Smicksburg quadrangle, Pennsylvania: Pennsylvania Geological Survey, 4th ser., Atlas 55, 252 p.
- _____, 1958, Geology and mineral resources of the New Florence quadrangle, Pennsylvania: Pennsylvania Geological Survey, 4th ser., Atlas 57, 165 p.
- Stone, R. W., 1905, Mineral resources of the Elders Ridge quadrangle, Pennsylvania: U.S. Geological Survey Bulletin 256, 86 p.
- _____, 1905, Elders Ridge folio, Pennsylvania: U.S. Geological Survey Geologic Atlas of the U.S., Folio 123, 10 p.
- Wolfson, D. E., Birge, G. W., and Naugle, B. W., 1957, Carbonizing properties of Indiana County, Pa., coals: U.S. Bureau of Mines Report of Investigations 5314, 18 p.

EXPLANATION



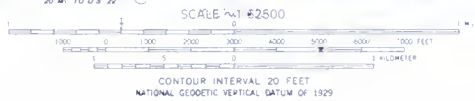
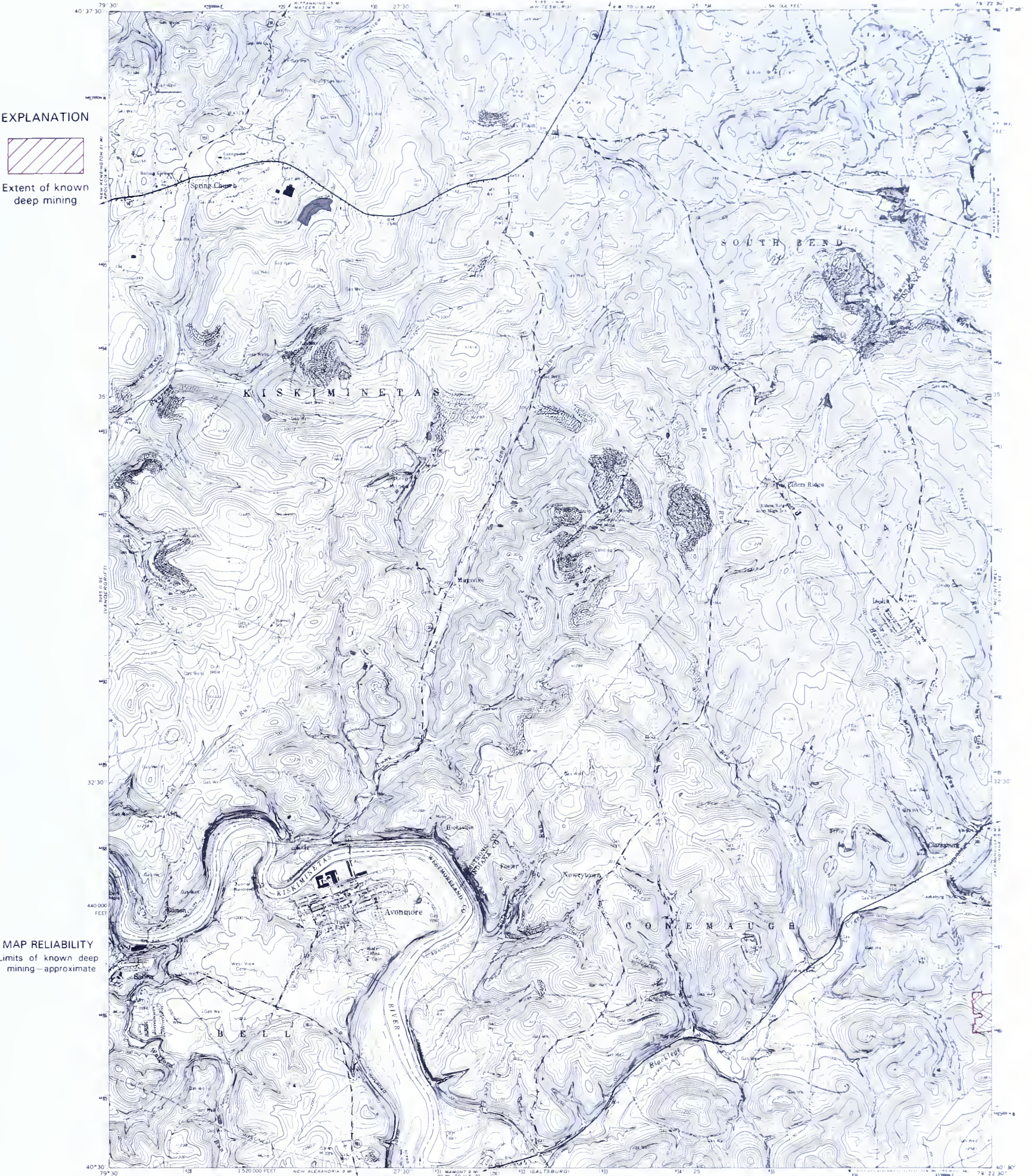
Extent of known
deep mining

MAP RELIABILITY

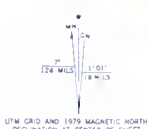
Limits of known deep
mining—approximate

SOURCE

Limits of deep mining from unpublished map by W. A. Bragonier,
Rochester and Pittsburgh Coal Company (1986).



ROAD CLASSIFICATION	
Heavy-duty	Light-duty
Medium-duty	Unimproved dirt
State Route	



MINED-OUT AREA OF THE
UPPER KITTANNING COAL

AVONMORE

EXPLANATION



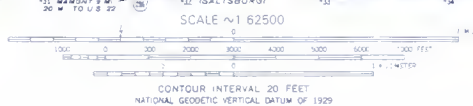
Extent of known
deep mining

MAP RELIABILITY

Limits of known deep
mining—approximate

SOURCES

Limits of deep mining from unpublished maps by W. A. Bragonier,
Rochester and Pittsburgh Coal Company (1986, 1991).

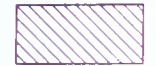


MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

AVONMORE

EXPLANATION

Crop line of the
Pittsburgh coal



Extent of known
strip mining



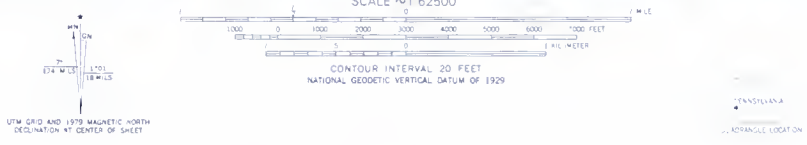
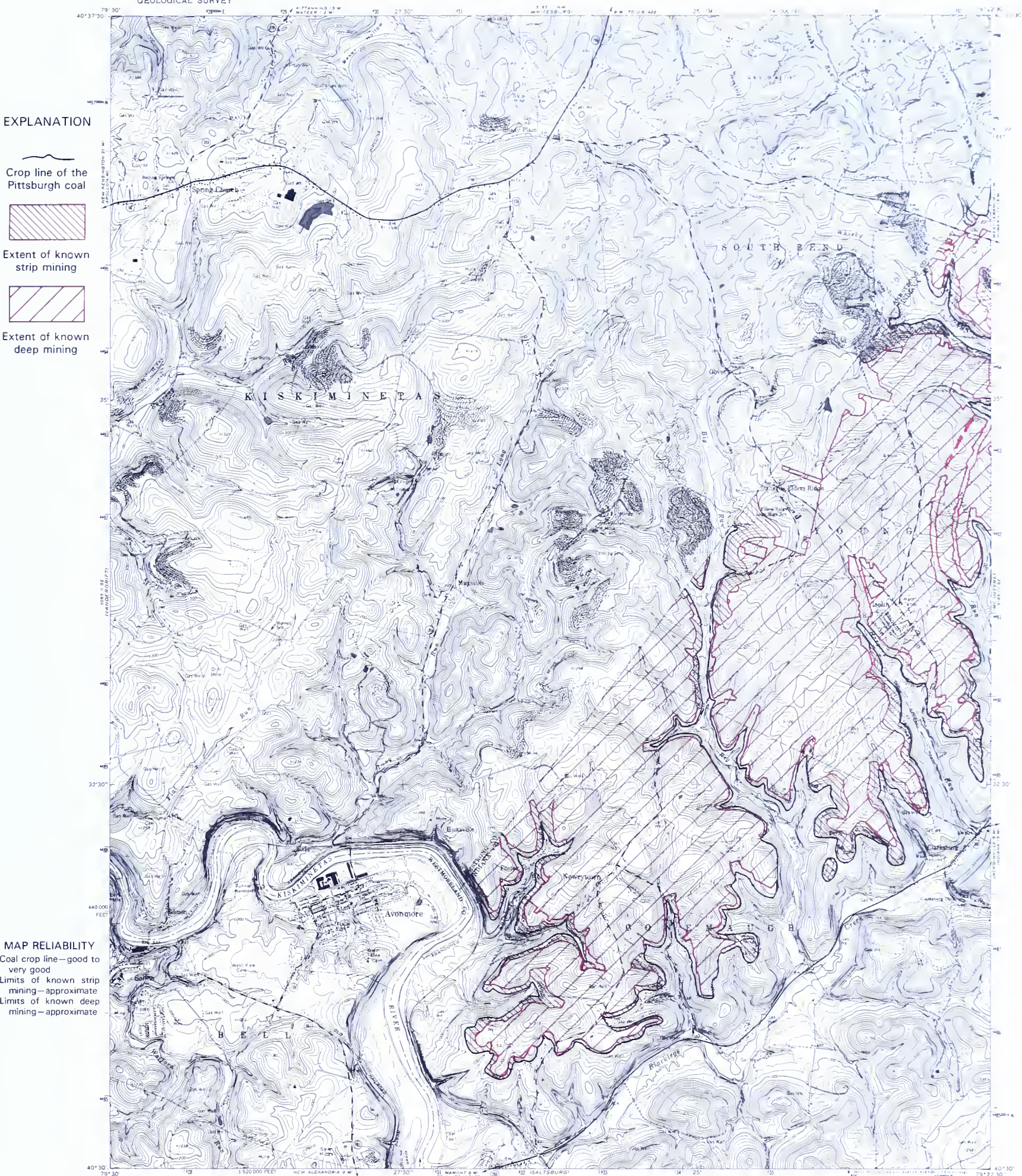
Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map, unpublished map from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1982), and unpublished data from Rochester and Pittsburgh Coal Company (1991). Limits of deep mining from unpublished map by Bragonier (1986).

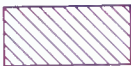


CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

AVONMORE

EXPLANATION

Crop line of the
Redstone coal

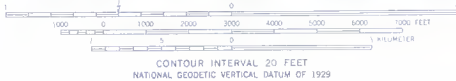
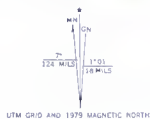


Extent of known
strip mining

MAP RELIABILITY
Coal crop line—very good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), and unpublished map from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1982).
Limits of strip mining based on interpretation of topographic map and unpublished map from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1982).



ROAD CLASSIFICATION	
Heavy duty	Light duty
Medium duty	Unimproved dirt
	State Route

AVONMORE

CROP LINE AND MINED-OUT AREAS OF THE
REDSTONE COAL

EXPLANATION

Crop line of the
Sewickley coal

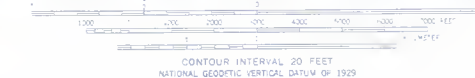
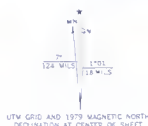


Extent of known
strip mining

MAP RELIABILITY
Coal crop line—very good
Limits of known strip
mining—approximate

SOURCES

Crop line based on unpublished data and on unpublished map
by W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986).
Limits of strip mining based on interpretation of topographic
map.






CROP LINE AND MINED-OUT AREA OF THE
SEWICKLEY COAL

AVONMORE

EXPLANATION

CROP LINES

-  Sewickley coal
-  Redstone coal
-  Pittsburgh coal

-  Syncline
Showing axial-plane trace and direction of plunge.

-  Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.

- MAP RELIABILITY
Coal crop lines—good
Structure contours—good

SOURCES

Crop line of the Pittsburgh coal slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Crop line of the Sewickley coal based on unpublished data and on unpublished map by Bragonier (1986).
Other crop lines from unpublished map by Bragonier (1986) and unpublished map from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1982).
Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



- ROAD CLASSIFICATION
- Heavy duty  Light duty 
- Medium duty  Unimproved dirt 
-  State Route

AVONMORE

COAL CROP LINES AND STRUCTURE CONTOURS

EXPLANATION

Crop line of the
Lower Freeport coal

Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY

Coal crop line—very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished maps by Bragonier (1986, 1991).



CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

EXPLANATION

Crop line of the
Upper Freeport coal

Extent of known
strip mining

Extent of known
deep mining

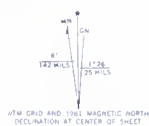
MAP RELIABILITY

Coal crop line—very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986).



ROAD CLASSIFICATION

Heavy duty ——— Light duty ———
Med. duty ——— Improved dirt ———
U.S. Route ——— State Route ———



BARNESBORO

**CROP LINE AND MINED OUT AREAS OF THE
UPPER FREEPORT COAL**

BRUSH VALLEY SYNCLINE

EXPLANATION

CROP LINES

- du Duquesne coal
- uf Upper Freeport coal
- lf Lower Freeport coal
- uk Upper Kittanning coal

- Anticline
Showing axial-plane trace and direction of plunge.
- Syncline
Showing axial-plane trace and direction of plunge.

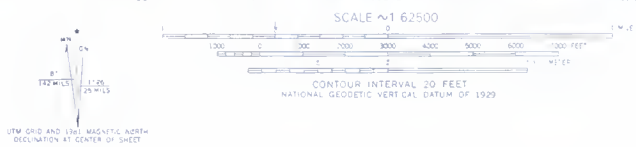
Structure contour
Altitude of the base of the
Lower Freeport coal, in feet
above mean sea level. Con-
tour interval 20 feet.

MAP RELIABILITY
Coal crop lines—very
good
Structure contours—very
good



SOURCES

Crop line of the Upper Freeport coal slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Other crop lines from unpublished map by Bragonier (1986).
Structure contours very slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



ROAD CLASSIFICATION
Highway
Major road
Minor road
S. Road
State Road

COAL CROP LINES AND
STRUCTURE CONTOURS

BARNESBORO

BRUSH VALLEY SYNCLINE

EXPLANATION

CROP LINES

du
Duquesne coal

uf
Upper Freeport coal

lf
Lower Freeport coal

uk
Upper Kittanning coal



Anticline
Showing axial-plane trace
and direction of plunge.



Syncline
Showing axial-plane trace
and direction of plunge.

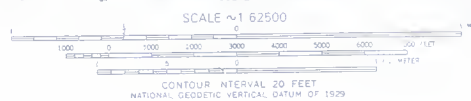
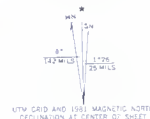
—1800—
Structure contour
Altitude of the base of the
Lower Freeport coal, in feet
above mean sea level. Con-
tour interval 20 feet.

MAP RELIABILITY

Coal crop lines—very
good
Structure contours—very
good

SOURCES

Crop line of the Upper Freeport coal slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Other crop lines from unpublished map by Bragonier (1986).
Structure contours very slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



ROAD CLASSIFICATION

Heavy-duty
Med. duty
Light-duty
Unimproved
Scale Route

BARNESBORO

COAL CROP LINES AND
STRUCTURE CONTOURS

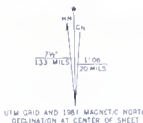
EXPLANATION

- Crop line of the Pittsburgh coal
- Extent of known strip mining
- Extent of known deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986).



CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

BLAIRSVILLE

JACKSONVILLE ANTICLINE

EXPLANATION

CROP LINES

Pittsburgh coal

Upper Freeport coal



Anticline

Showing axial-plane trace and direction of plunge.



Syncline

Showing axial-plane trace and direction of plunge.

Structure contour

Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY

Coal crop lines—good
Structure contours—good

SOURCES

Crop lines from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Structure contours modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEETSCALE ~1:62,500
1 2 3 4 5 6 7 8 9 10 11 12
0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
1:12,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Heavy-duty
Medium-duty
Light-duty
Unimproved
U.S. Route
State Route

BLAIRSVILLE

COAL CROP LINES AND
STRUCTURE CONTOURS

EXPLANATION

Crop line of the
Brookville coal

Extent of known
strip mining

MAP RELIABILITY
Coal crop line—fair to
good
Limits of known strip
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

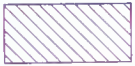
ROAD CLASSIFICATION
Heavy duty Light duty
Medium duty Unimproved dirt
U.S. Route State Route

BOLIVAR

CROP LINE AND MINED OUT AREAS OF THE
BROOKVILLE COAL

EXPLANATION

Crop line of the
Lower Kittanning
coal



Extent of known
strip mining



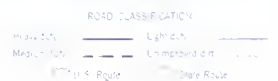
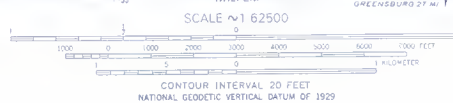
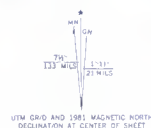
Extent of known
deep mining

MAP RELIABILITY

Coal crop line—fair to
good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).



BOLIVAR

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Middle Kittanning coal



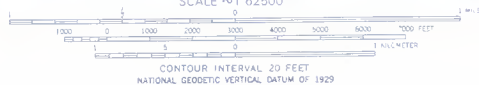
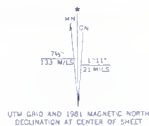
Extent of known
strip mining

MAP RELIABILITY

Coal crop line—fair to
good
Limits of known strip
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.



BOLIVAR

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

EXPLANATION

Crop line of the
Upper Kittanning coal

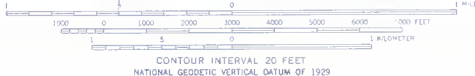
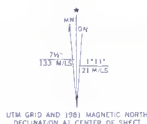


Extent of known
strip mining

MAP RELIABILITY
Coal crop line—fair to
good
Limits of known strip
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.



ROAD CLASSIFICATION	
Heavy duty	Light duty
Medium duty	Gravelled dirt
U.S. Route	State Route

BOLIVAR

CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

Extent of known
strip mining

MAP RELIABILITY
Coal crop line—fair to good
Limits of known strip mining—approximate

Crop line modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map.

UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Heavy Duty _____ Light Duty _____

Medium Duty _____ Limited Use _____

1 1/2" 2" 3" 4" 5" 6" 8" 10" 12" 14" 16" 18" 20" 22" 24" 26" 28" 30" 32" 34" 36" 38" 40" 42" 44" 46" 48" 50" 52" 54" 56" 58" 60" 62" 64" 66" 68" 70" 72" 74" 76" 78" 80" 82" 84" 86" 88" 90" 92" 94" 96" 98" 100"

State Route

BOLIVAR

CROP LINE AND MINED-OUT AREAS OF THE LOWER FREEPORT COAL

EXPLANATION

Crop line of the
Upper Freeport coal

Extent of known
strip mining

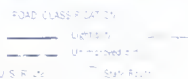
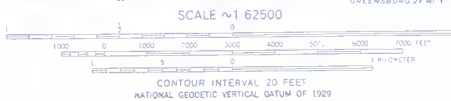
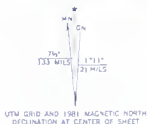
Extent of known
deep mining

MAP RELIABILITY

Coal crop line—fair to
good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).



BOLIVAR

**CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL**

EXPLANATION

- Crop line of the
Pittsburgh coal
- Extent of known
strip mining
- Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986).

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929







ROAD CLASSIFICATION
Heavy-duty Light-duty
Medium-duty Improved dirt
Gravel
Dirt
Gravel
Dirt
Gravel
Dirt

CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

BOLIVAR

EXPLANATION

CROP LINES

-  Pittsburgh coal
-  Upper Freeport coal
-  Lower Freeport coal
-  Upper Kittanning coal
-  Middle Kittanning coal
-  Lower Kittanning coal
-  Brookville coal
-  Mercer coal

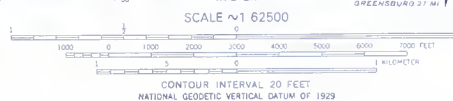
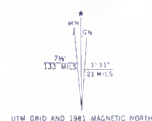
-  Anticline
Showing axial-plane trace
and direction of plunge.
-  Syncline
Showing axial-plane trace
and direction of plunge.

-  Structure contour
Altitude of the base of the
Upper Freeport coal, in feet
above mean sea level. Contour
interval 20 feet.

- MAP RELIABILITY**
Coal crop lines—fair to
good
Structure contours—fair
to good

SOURCES

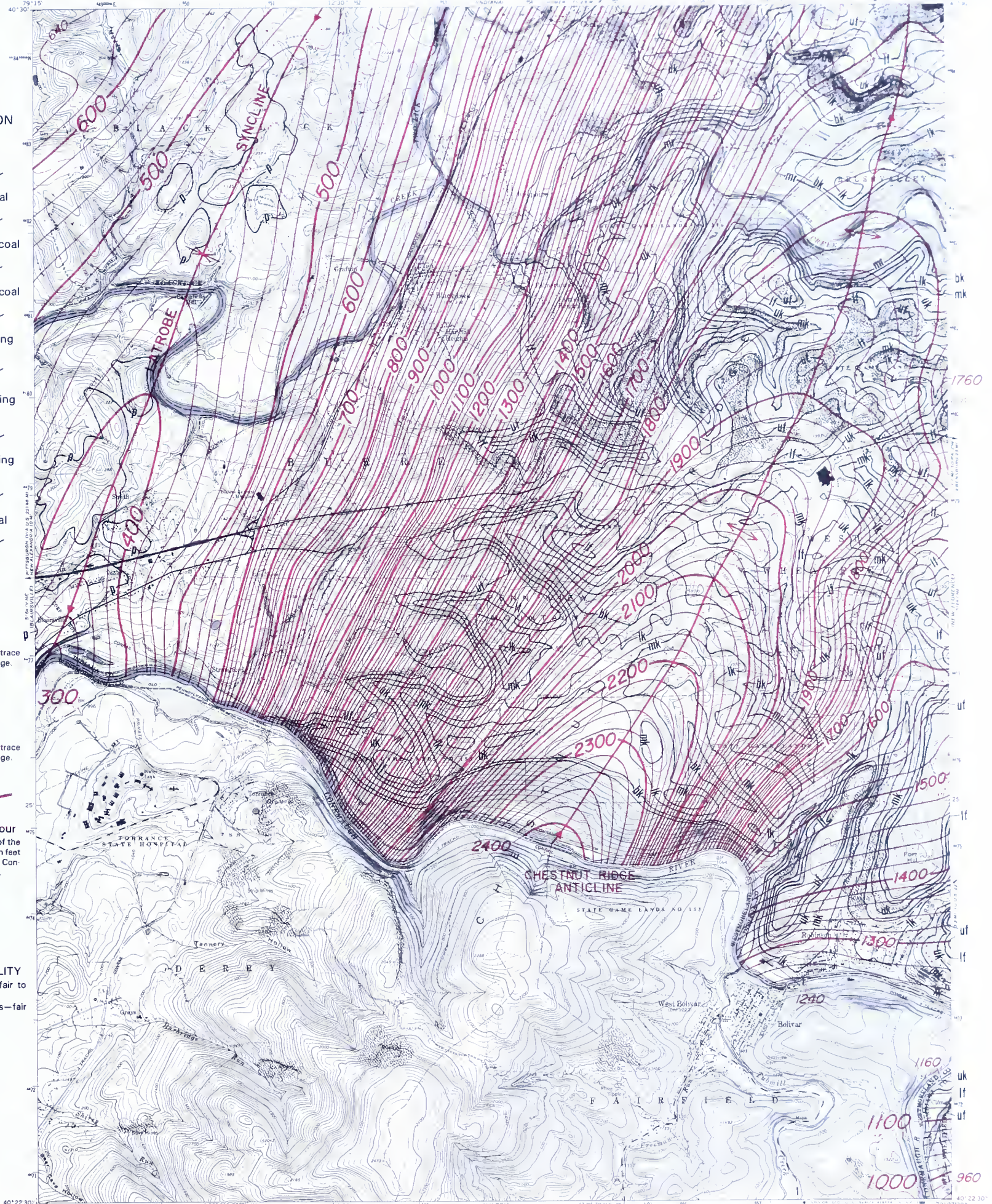
Crop line of the Pittsburgh coal slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Other crop lines modified by A. D. Glover from unpublished map by Bragonier (1986) based on interpretation of topographic map.
Structure contours modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



ROAD CLASSIFICATION	
Heavy duty	Light duty
Medium duty	Unimproved dirt
U.S. Route	State Route

BOLIVAR

COAL CROP LINES AND STRUCTURE CONTOURS



EXPLANATION

Crop line of the
Lower Kittanning
coal

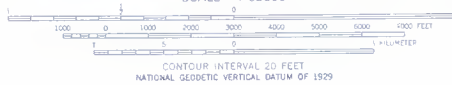
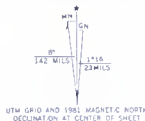
Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).



BRUSH VALLEY

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Middle Kittanning
coal



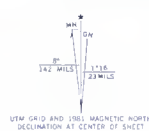
Extent of known
strip mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.

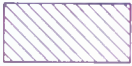


BRUSH VALLEY

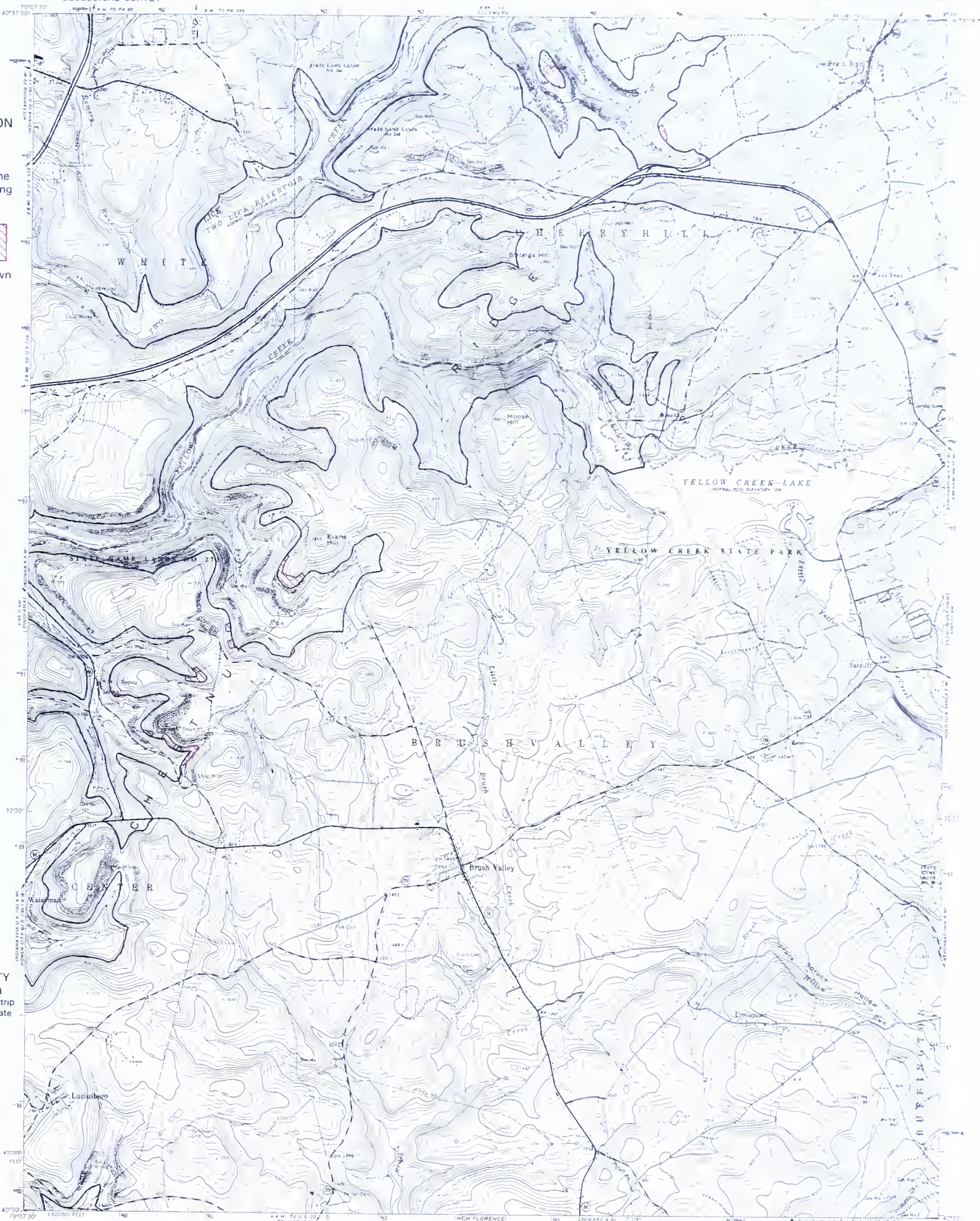
CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

EXPLANATION

Crop line of the
Upper Kittanning
coal



Extent of known
strip mining

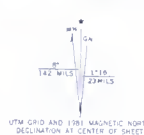


MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.



SCALE 1:62500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

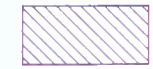
ROAD CLASSIFICATION
Heavy-duty Light-duty
Med.-heavy Unimproved
U.S. Route State Route

BRUSH VALLEY

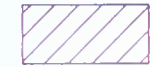
CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

EXPLANATION

Crop line of the
Lower Freeport coal



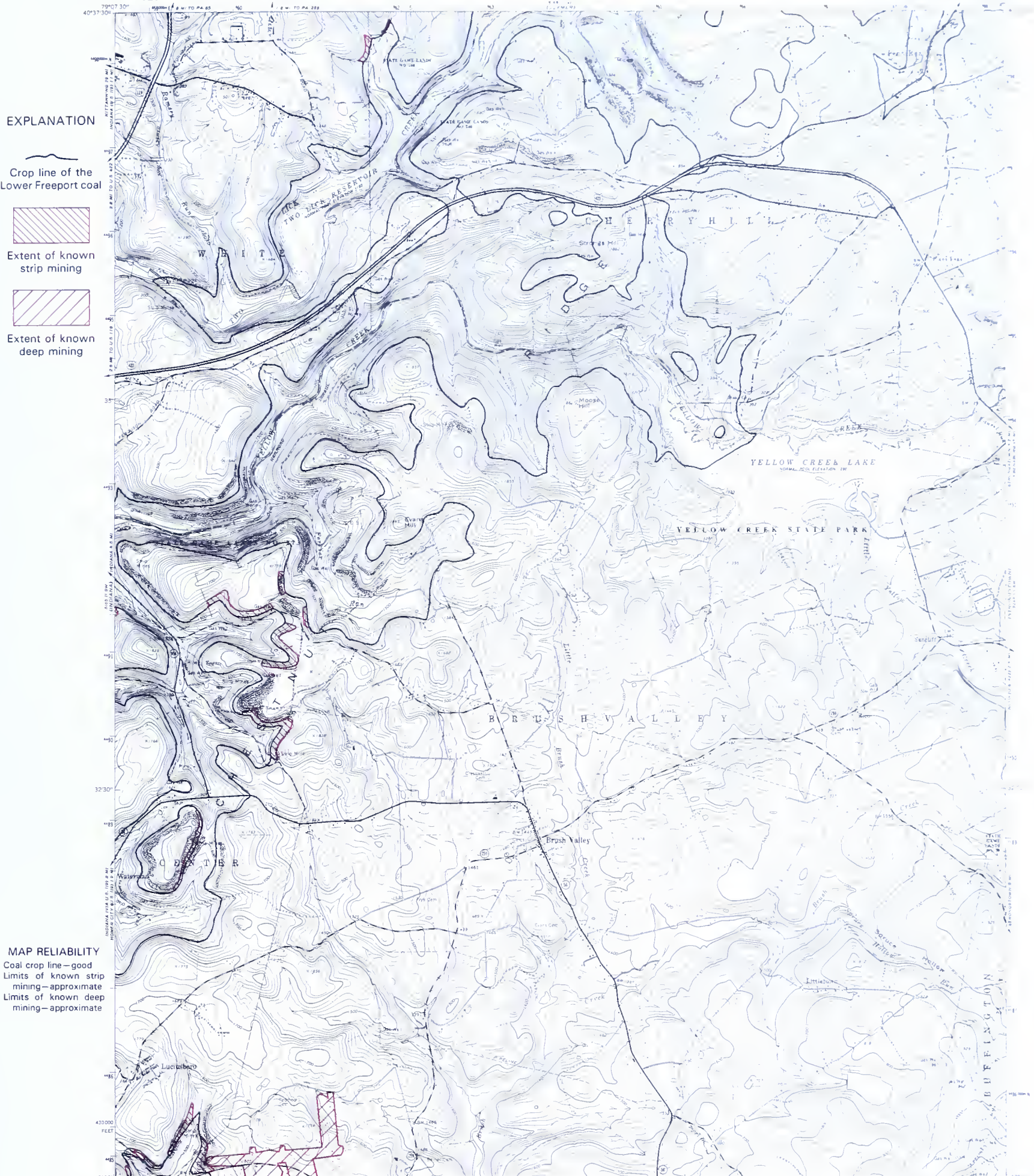
Extent of known
strip mining



Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).



CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

BRUSH VALLEY

EXPLANATION

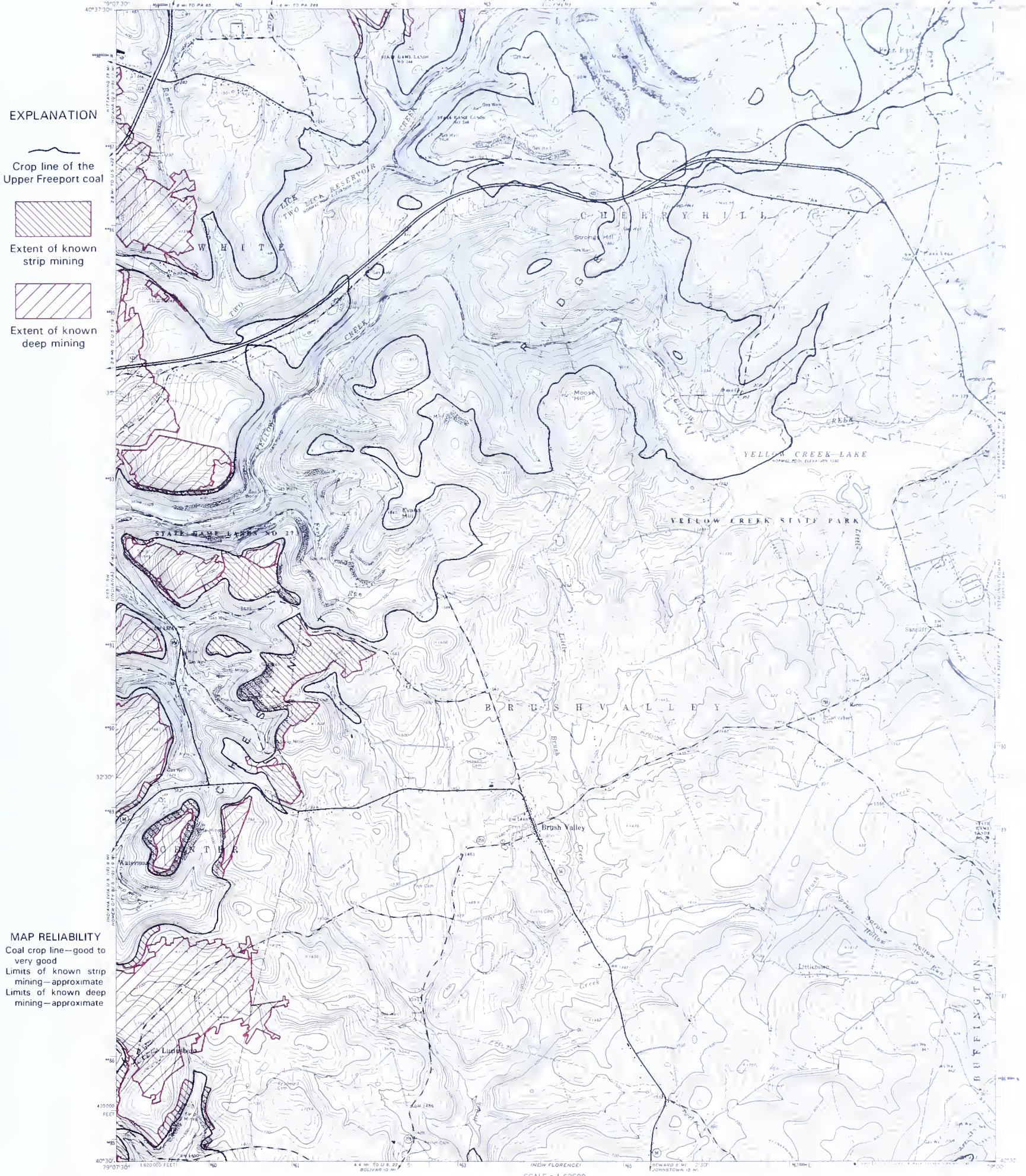
Crop line of the
Upper Freeport coal

Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES
Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).

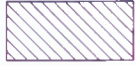


BRUSH VALLEY

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

EXPLANATION

Crop line of the
Mahoning coal



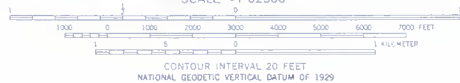
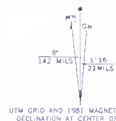
Extent of known
strip mining

MAP RELIABILITY

Coal crop line—very good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.



BRUSH VALLEY

CROP LINE AND MINED-OUT AREAS OF THE
MAHONING COAL

EXPLANATION

CROP LINES

—mh—
Mahoning coal

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lk—
Lower Kittanning coal

—bk—
Brookville coal

—mr—
Mercer coal



Anticline
Showing axial-plane trace
and direction of plunge.



Syncline
Showing axial-plane trace
and direction of plunge.

—1500—

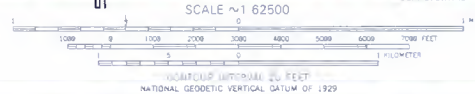
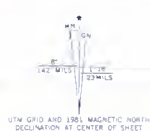
Structure contour
Altitude of the base of the
Lower Kittanning coal, in
feet above mean sea level.
Contour interval 20 feet.

MAP RELIABILITY

Coal crop lines—good to
very good
Structure contours—good

SOURCES

Crop lines from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Structure contours modified by A. D. Glover from unpublished
map by Bragonier (1986) using unpublished data.



NOLO ANTICLINE

ROAD CLASSIFICATION

Heavy-duty ——— Light-duty ———

Medium-duty ——— Unimproved d.f. ———

U.S. Route ——— State Route ———

BRUSH VALLEY

COAL CROP LINES AND
STRUCTURE CONTOURS

EXPLANATION

Crop line of the
Brookville coal

Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map. Limits of deep mining from unpublished map by Bragonier (1986).

UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62,500
1 2 3 4 5 6 7 8 9 10 11 12
0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
1 2 3 4 5 6 7 8 9 10 11 12
0 1 2 3 4 5 6 7 8 9 10 11 12
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Primary highway, all-weather, hard surface
Secondary highway, all-weather, hard surface
Light-duty road, all-weather, improved surface
Unimproved road, fair or dry weather
U.S. Route
State Route

BURNSIDE

CROP LINE AND MINED-OUT AREAS OF THE
BROOKVILLE COAL

EXPLANATION

- Crop line of the
Clarion coal
- Extent of known
strip mining

MAP RELIABILITY

- Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.

CROP LINE AND MINED-OUT AREAS OF THE
CLARION COAL

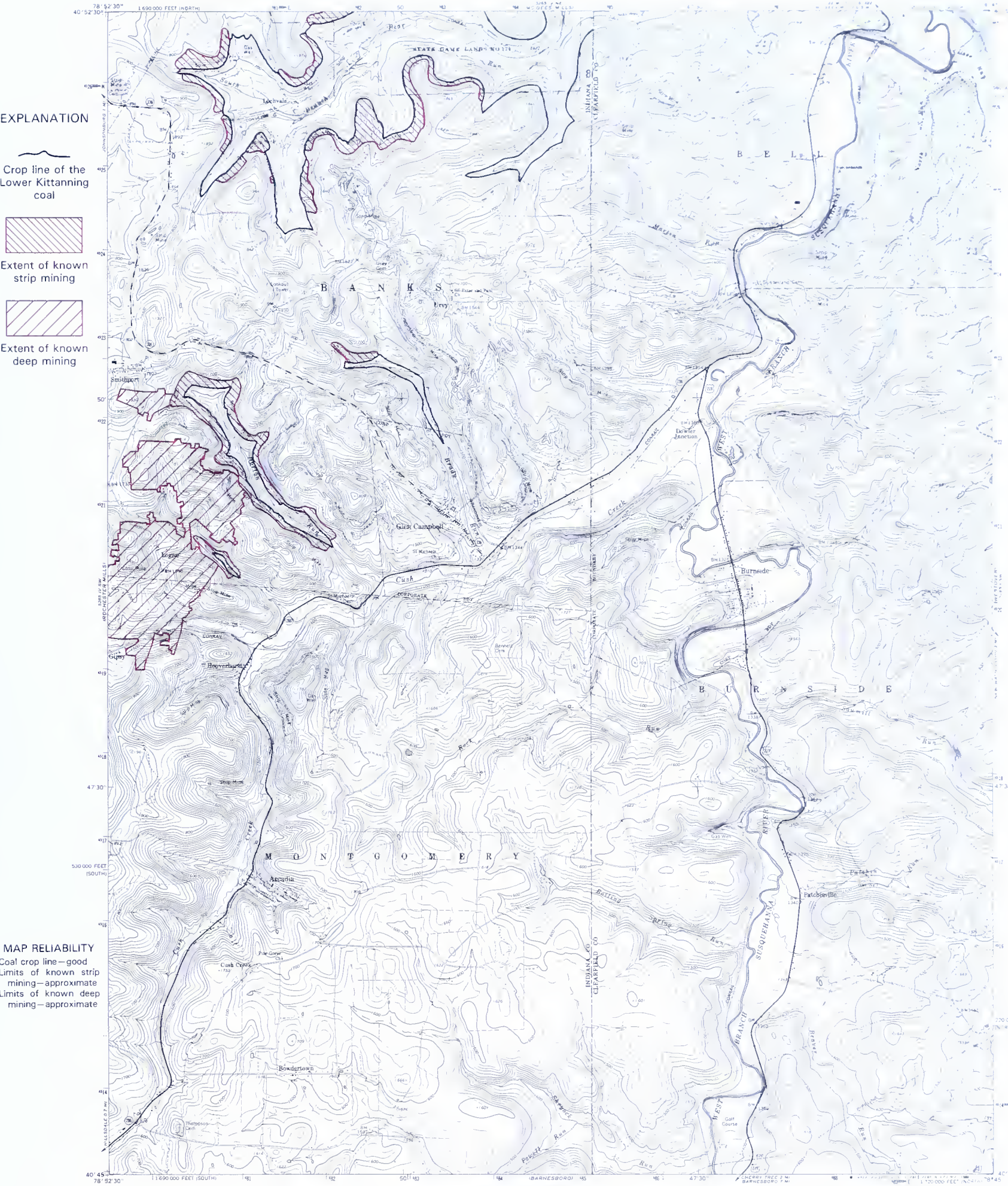
BURNSIDE

EXPLANATION

- Crop line of the Lower Kittanning coal
- Extent of known strip mining
- Extent of known deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

SOURCES
Crop line modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986).



ROAD CLASSIFICATION

Primary highway, all-weather hard surface	Light-duty road, all-weather improved surface
Secondary highway, all-weather hard surface	Unimproved road, fair or dry weather
U.S. Route	State Route

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

BURNSIDE

EXPLANATION

Crop line of the
Middle Kittanning
coal

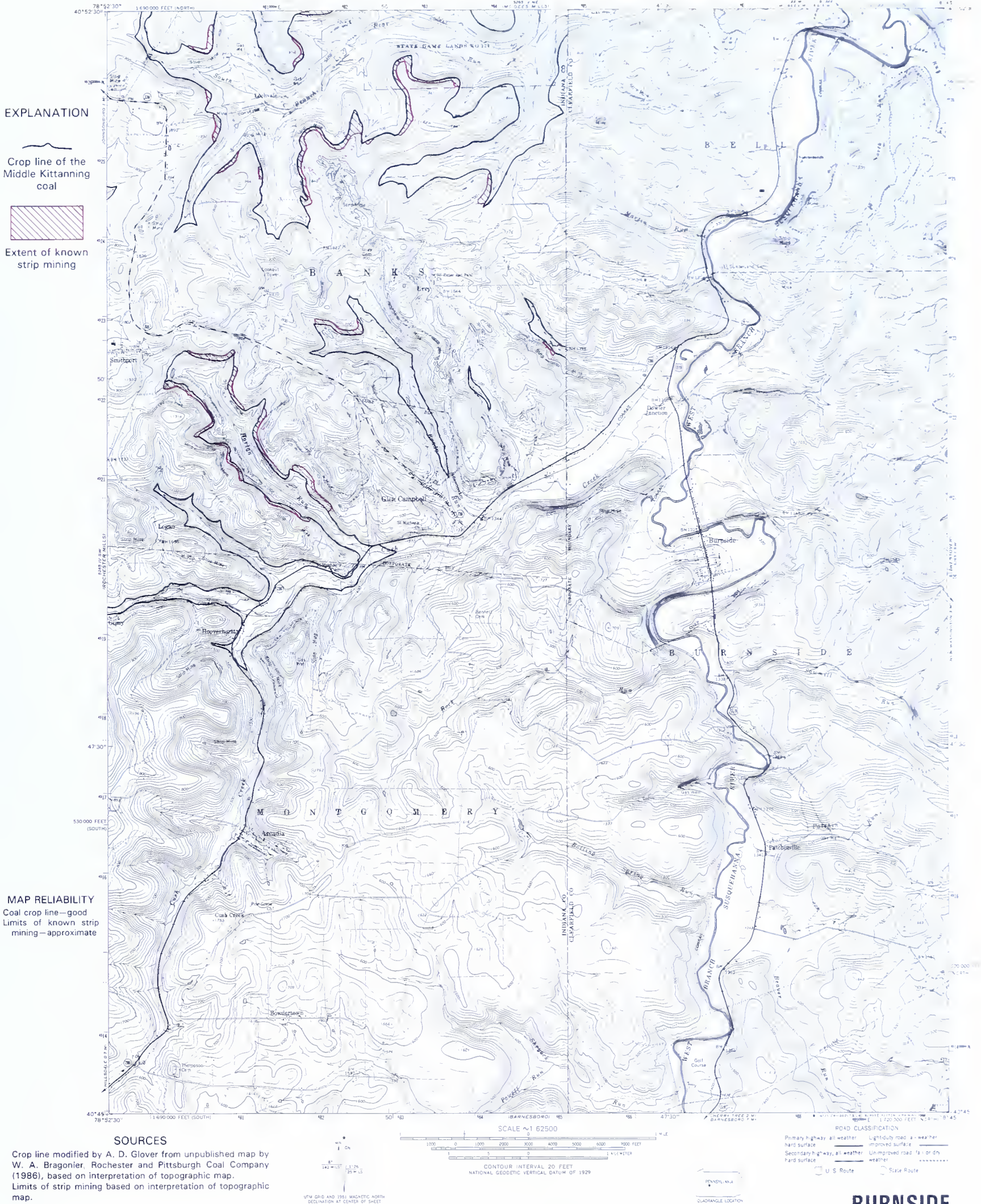
Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL



BURNSIDE

EXPLANATION

Crop line of the
Upper Kittanning
coal



Extent of known
strip mining



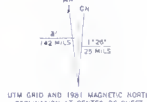
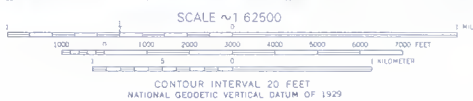
Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).



ROAD CLASSIFICATION	
Primary highway, all weather hard surface	Light-duty road, all weather improved surface
Secondary highway, all weather hard surface	Unimproved road, fair or dry weather
U.S. Route	State Route

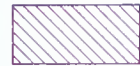


CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

BURNSIDE

EXPLANATION

Crop line of the
Lower Freeport coal



Extent of known
strip mining



Extent of known
deep mining

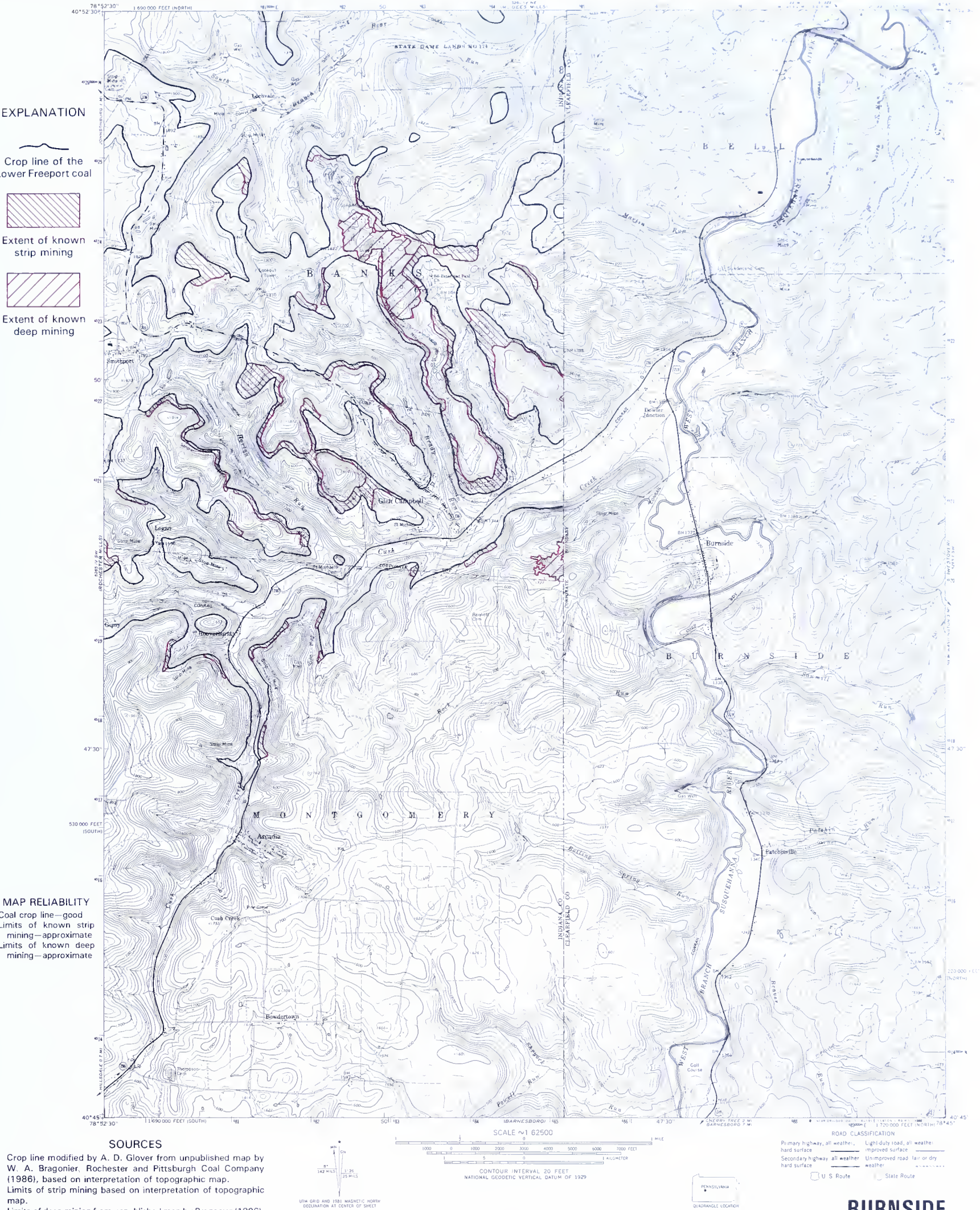
MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate




SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).

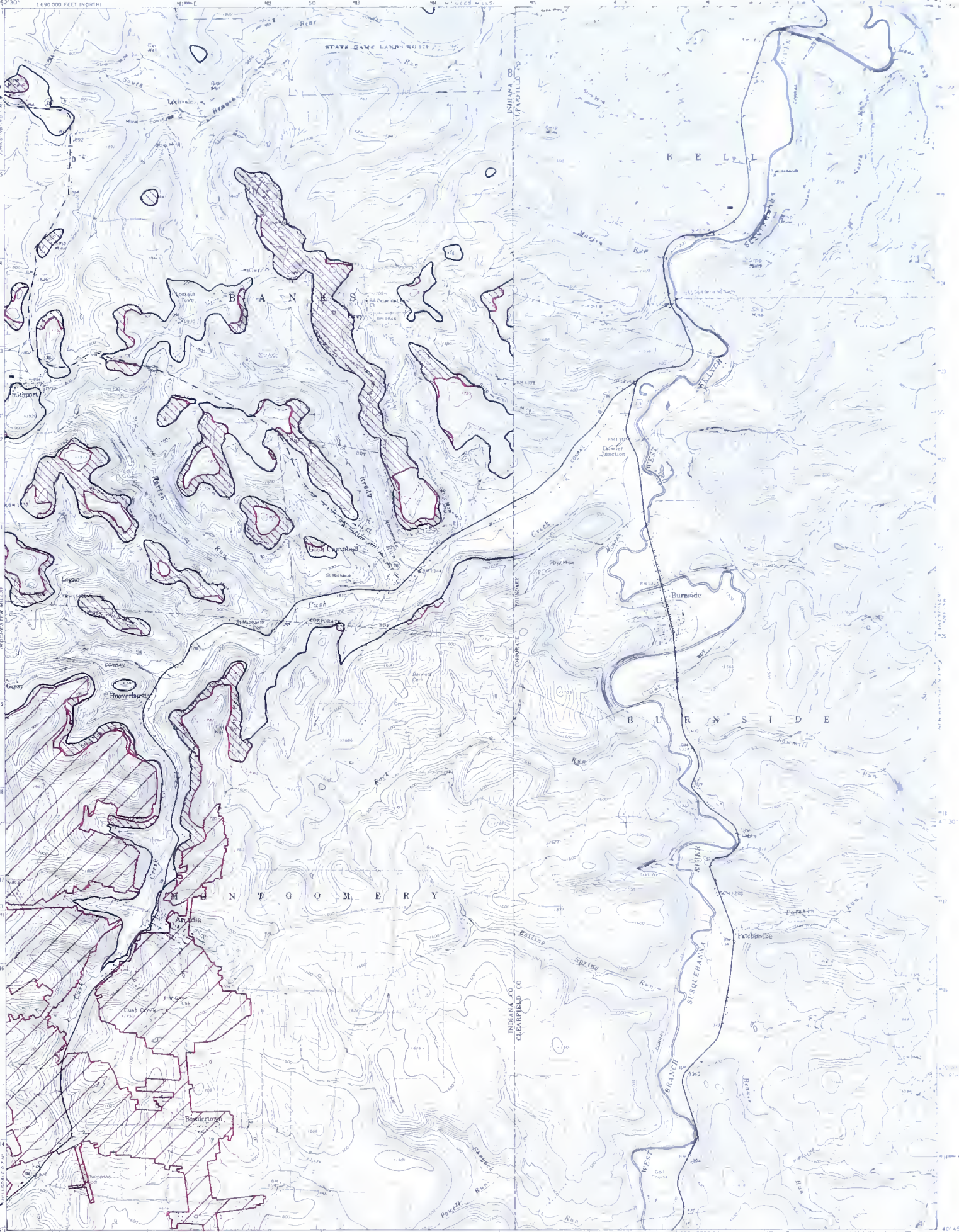
CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL



EXPLANATION

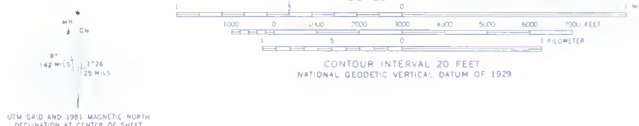
-  Crop line of the Upper Freeport coal
-  Extent of known strip mining
-  Extent of known deep mining

- MAP RELIABILITY
- Coal crop line—good to very good
 - Limits of known strip mining—approximate
 - Limits of known deep mining—approximate



SOURCES

Crop line modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map. Limits of deep mining from unpublished map by Bragonier (1986).



ROAD CLASSIFICATION

Primary highway all weather	Light duty road all weather
hard surface	improved surface
Secondary highway all weather	unimproved road fair or dry
hard surface	weather
U.S. Route	State Route

BURNSIDE

**CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL**

CHESTNUT RIDGE ANTICLINE

EXPLANATION

CROP LINES

du
Duquesne coal

uf
Upper Freeport coal

lf
Lower Freeport coal

uk
Upper Kittanning coal

mk
Middle Kittanning coal

lk
Lower Kittanning coal

cl
Clarion coal

bk
Brookville coal

mr
Mercer coal



Anticline
Showing axial-plane trace
and direction of plunge.



Syncline
Showing axial-plane trace
and direction of plunge.

—1500—
Structure contour

Altitude of the base of the
Upper Freeport coal, in feet
above mean sea level. Con-
tour interval 20 feet.

MAP RELIABILITY

Coal crop lines—good to
very good
Structure contours—good

SOURCES

Crop lines of the Clarion, Brookville, and Mercer coals slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Other crop lines modified by A. D. Glover from unpublished map by Bragonier (1986) based on interpretation of topographic map.
Structure contours modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.

SCALE ~1:62,500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



ROAD CLASSIFICATION
Primary highway all weather: hard surface
Secondary highway all weather: improved surface
Unimproved road: fair or dry weather
U.S. Route
State Route

COAL CROP LINES AND
STRUCTURE CONTOURS

BURNSIDE

EXPLANATION

Crop line of the
Mercer coal

Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.

UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Mainly
Medium
Light
Unimproved
State Route

CROP LINE AND MINED-OUT AREAS OF THE
MERCER COAL

CLYMER

EXPLANATION

Crop line of the
Brookville coal



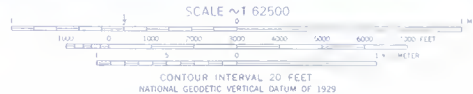
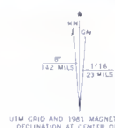
Extent of known
strip mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.



ROAD LOCATION
Light d. line
Unimproved d. line
U. S. Route
State Route

CLYMER

CROP LINE AND MINED-OUT AREAS OF THE
BROOKVILLE COAL

EXPLANATION

Crop line of the
Lower Kittanning
coal

Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map. Limits of deep mining from unpublished map by Bragonier (1986) and unpublished map from Tanoma Mining Company (1991).

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

CLYMER

EXPLANATION

Crop line of the
Middle Kittanning
coal



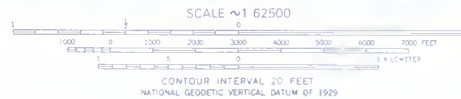
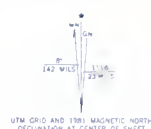
Extent of known
strip mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.



CLYMER

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

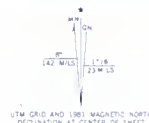
EXPLANATION

- Crop line of the
Upper Kittanning
coal
- Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.



CLYMER

CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

EXPLANATION

Crop line of the
Lower Freeport coal

Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good to
very good

Limits of known strip
mining—approximate

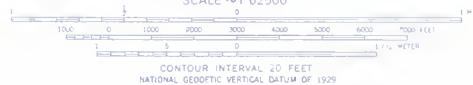
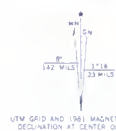
Limits of known deep
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).

Limits of strip mining based on interpretation of topographic
map.

Limits of deep mining from unpublished map by Bragonier (1986).



CLYMER

CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

EXPLANATION

Crop line of the
Upper Freeport coal

Extent of known
strip mining

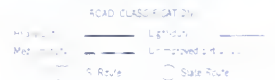
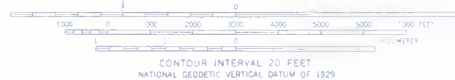
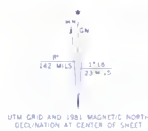
Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map. Limits of deep mining from unpublished map by Bragonier (1986).



CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

CLYMER

EXPLANATION

CROP LINES

Upper Freeport coal

Lower Freeport coal

Upper Kittanning coal

Middle Kittanning coal

Lower Kittanning coal

Brookville coal

Mercer coal



Anticline

Showing axial-plane trace and direction of plunge.



Syncline

Showing axial-plane trace and direction of plunge.

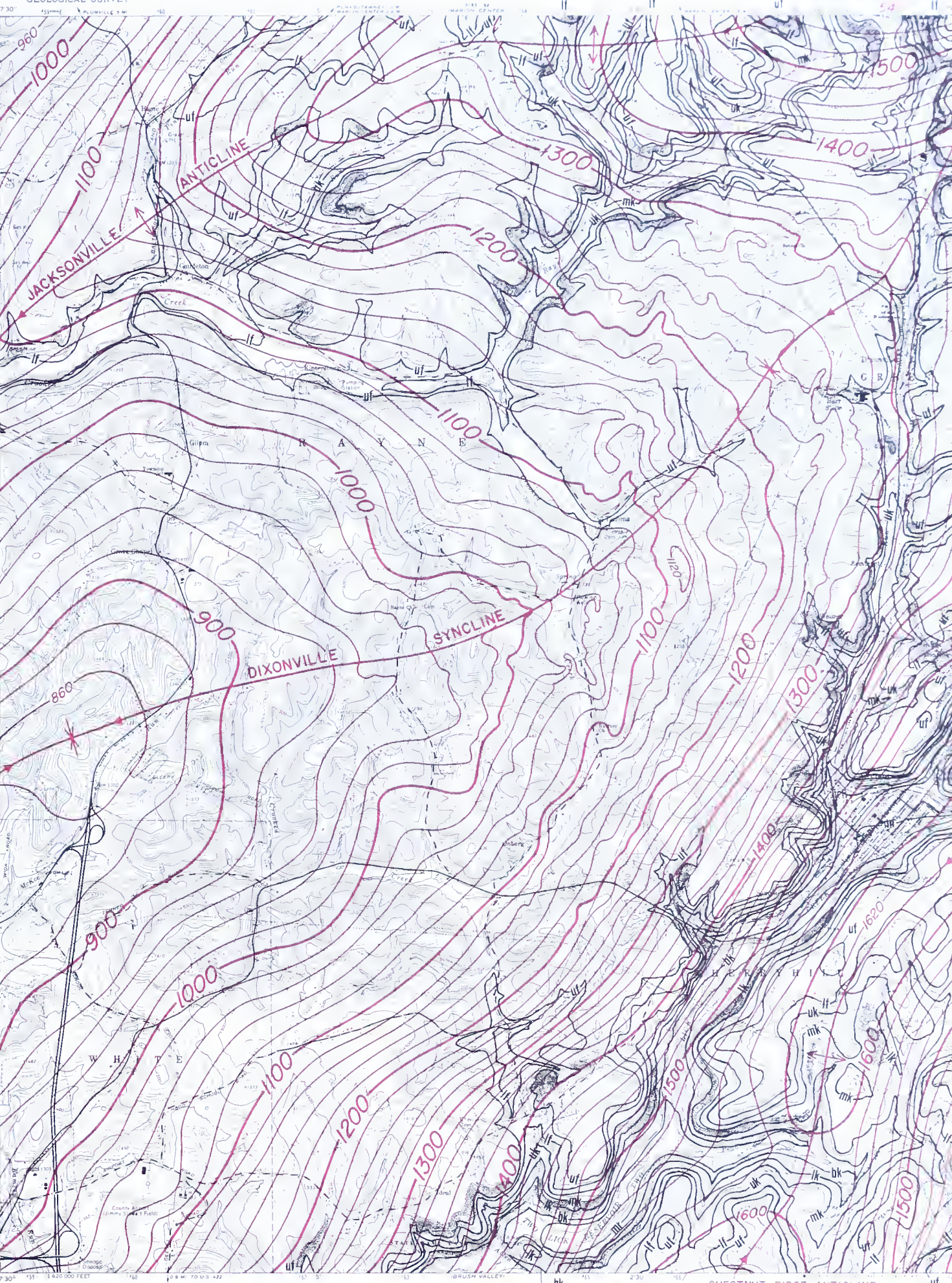
Structure contour

Altitude of the base of the Lower Freeport coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY

Coal crop lines—good to very good

Structure contours—good

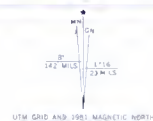


SOURCES

Crop lines of the Lower Freeport and Mercer coals from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).

Other crop lines slightly modified by A. D. Glover from unpublished map by Bragonier (1986) based on interpretation of topographic map.

Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



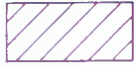
SCALE ~1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Heavy duty
Medium duty
Light duty
Unimproved dirt
State Route

CLYMER

COAL CROP LINES AND
STRUCTURE CONTOURS

EXPLANATION



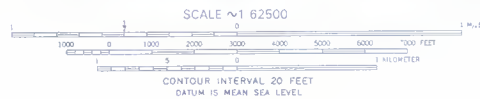
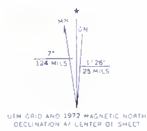
Extent of known
deep mining

MAP RELIABILITY

Limits of known deep
mining—approximate

SOURCE

Limits of deep mining from unpublished map by W. A. Bragonier,
Rochester and Pittsburgh Coal Company (1986).



MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

COLVER

EXPLANATION



Extent of known
deep mining

MAP RELIABILITY

Limits of known deep
mining—approximate

SOURCE

Limits of deep mining from unpublished map by W. A. Bragonier,
Rochester and Pittsburgh Coal Company (1986).

COLVER

MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

NOLO ANTICLINE

EXPLANATION

CROP LINE

Upper Freeport coal



Anticline

Showing axial-plane trace and direction of plunge.

—1700—

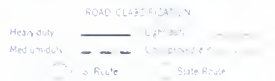
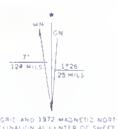
Structure contour
Altitude of the base of the
Lower Kittanning coal, in
feet above mean sea level.
Contour interval 20 feet

MAP RELIABILITY

Coal crop line—good
Structure contours—good

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



COAL CROP LINE AND
STRUCTURE CONTOURS

COLVER

EXPLANATION

Crop line of the
Brookville coal

Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.

SCALE ~1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Heavy duty
Light duty
Unimproved
Gravel

CROP LINE AND MINED-OUT AREA OF THE
BROOKVILLE COAL

COMMODORE

EXPLANATION

Crop line of the
Lower Kittanning
coal

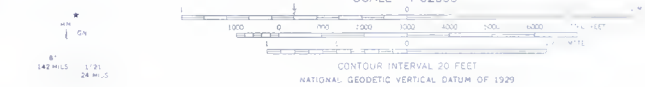
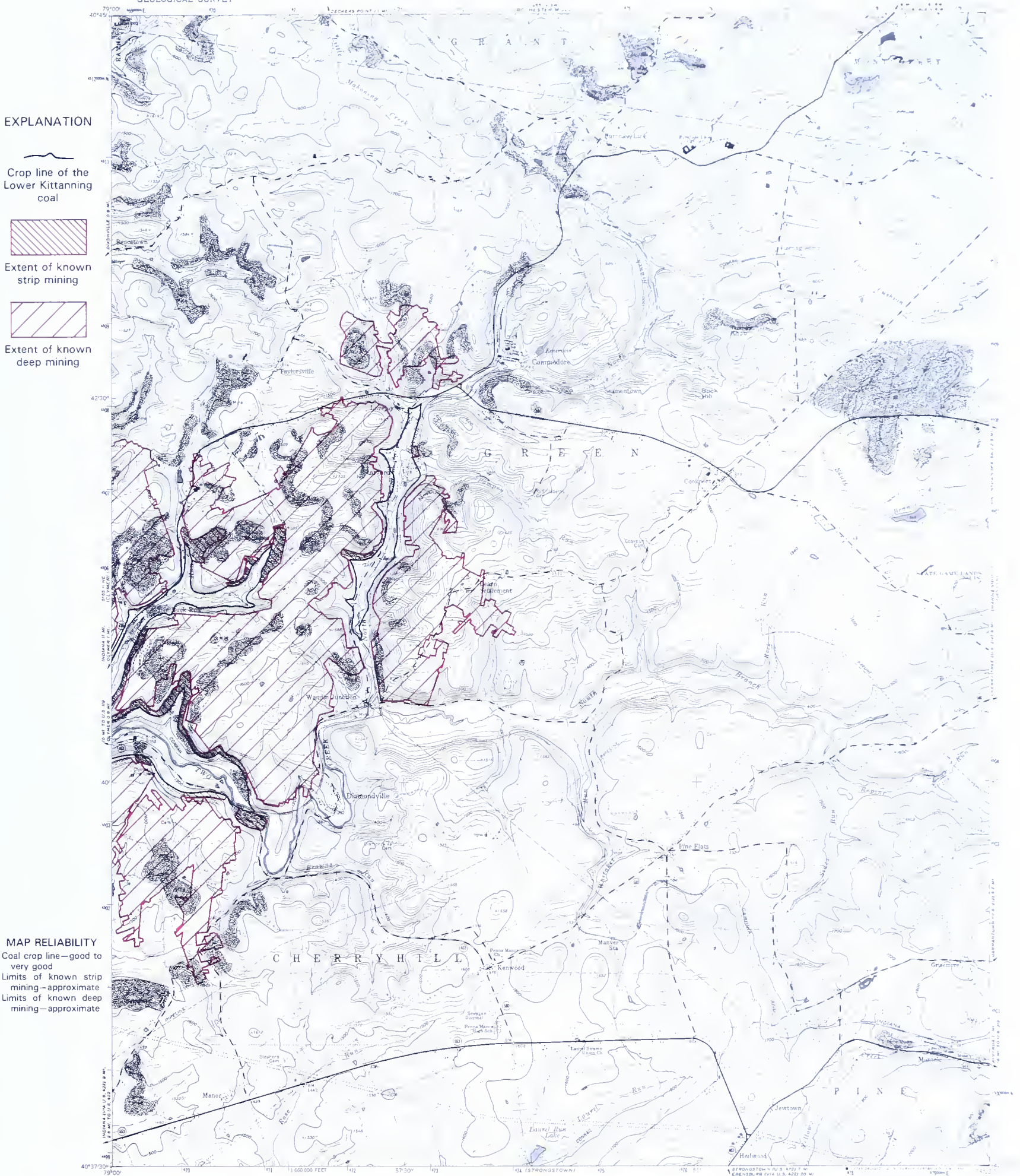
Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).

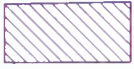


COMMODORE

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Middle Kittanning coal



Extent of known
strip mining

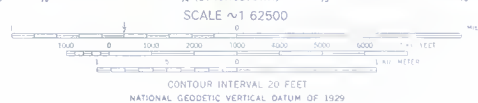
MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.

UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



COMMODORE

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

EXPLANATION

Crop line of the
Upper Kittanning
coal

Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.

UTM GRID AND 1983 MAGNETIC AZIMUTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

COMMODORE

CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

Extent of known
deep mining

Coal crop line—good to very good
Limits of known strip mining—approximate
Limits of known deep mining—approximate

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986) and unpublished map of Greenwich Collieries (1991).

COMMODORE

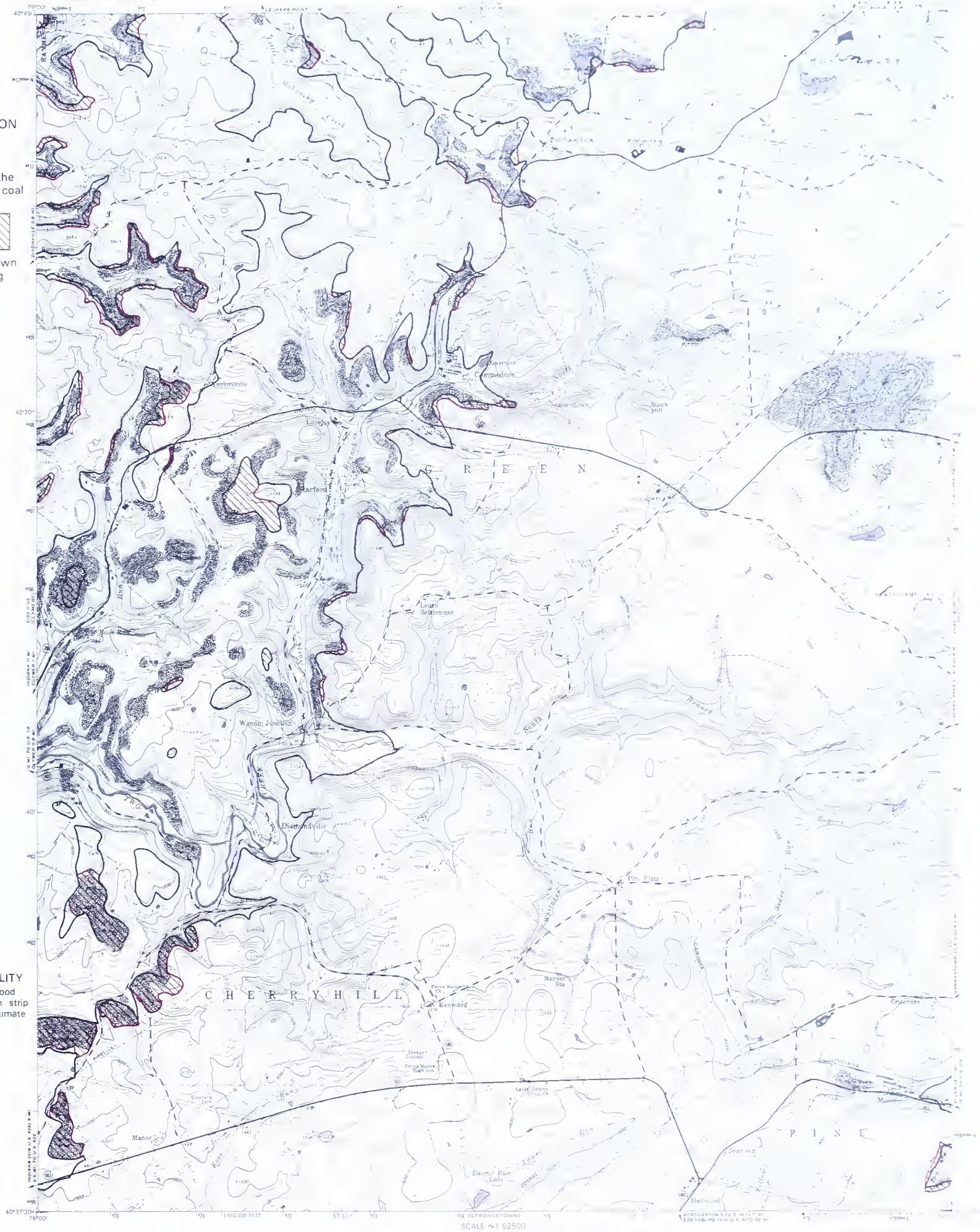
EXPLANATION

Crop line of the
Upper Freeport coal



Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate



SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic map.

UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

COMMODORE

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

EXPLANATION

Crop line of the
Duquesne coal



Extent of known
strip mining

MAP RELIABILITY

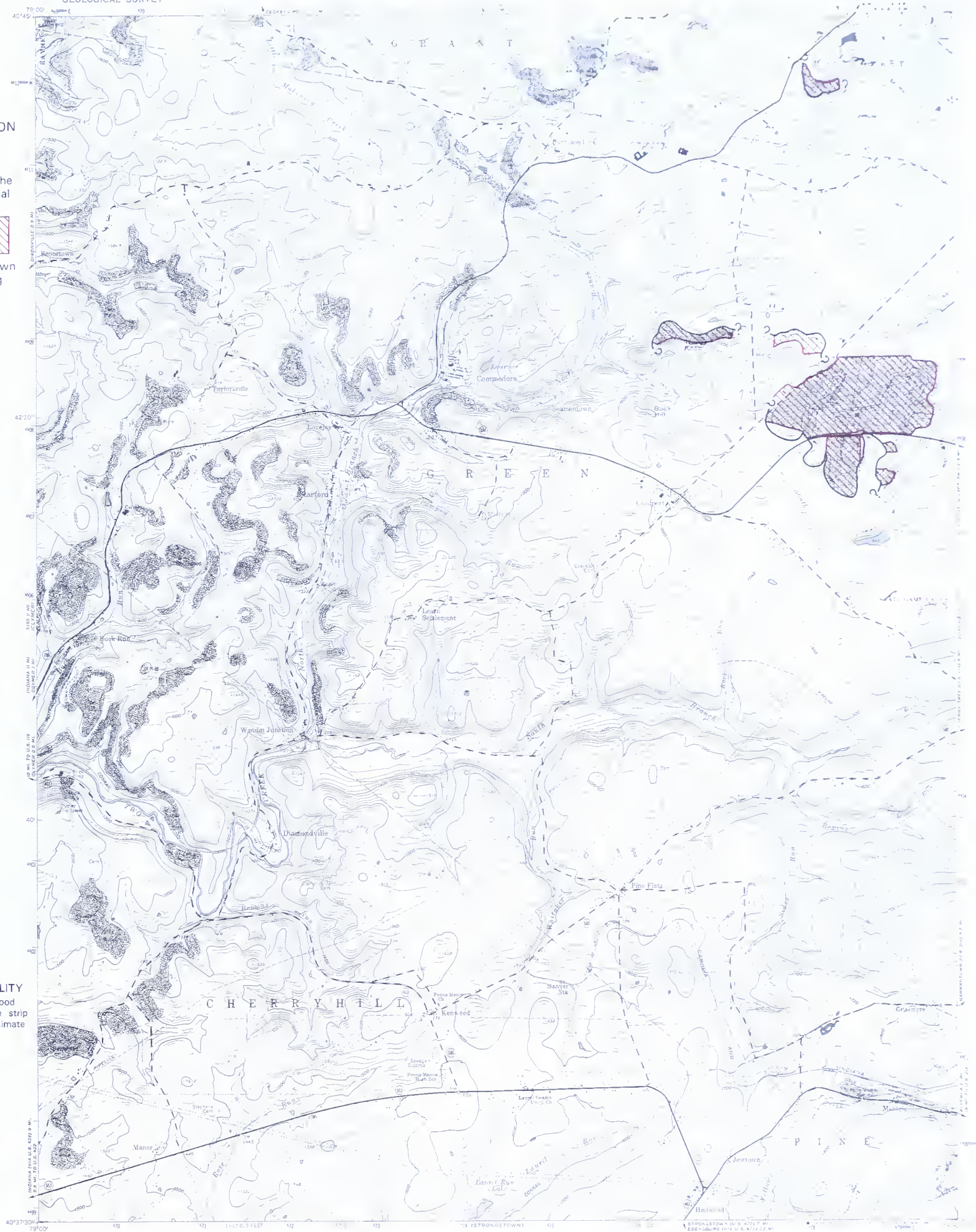
Coal crop line—good
Limits of known strip
mining—approximate

SOURCE

Crop line and limits of strip mining based on interpretation of
topographic map by A. D. Glover.

COMMODORE

CROP LINE AND MINED-OUT AREAS OF THE
DUQUESNE COAL



EXPLANATION

CROP LINES

-  Duquesne coal
-  Upper Freeport coal
-  Lower Freeport coal
-  Upper Kittanning coal
-  Middle Kittanning coal
-  Lower Kittanning coal
-  Brookville coal
-  Mercer coal

Anticline

Showing axial-plane trace and direction of plunge.

Syncline

Showing axial-plane trace and direction of plunge.

Structure contour

Altitude of the base of the Lower Freeport coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY

Coal crop lines—good to very good
Structure contours—good to very good

SOURCES

Crop line of the Duquesne coal by A. D. Glover based on interpretation of topographic map.
Crop line of the Lower Kittanning coal slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Other crop lines from unpublished map by Bragonier (1986).
Structure contours very slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



COAL CROP LINES AND STRUCTURE CONTOURS

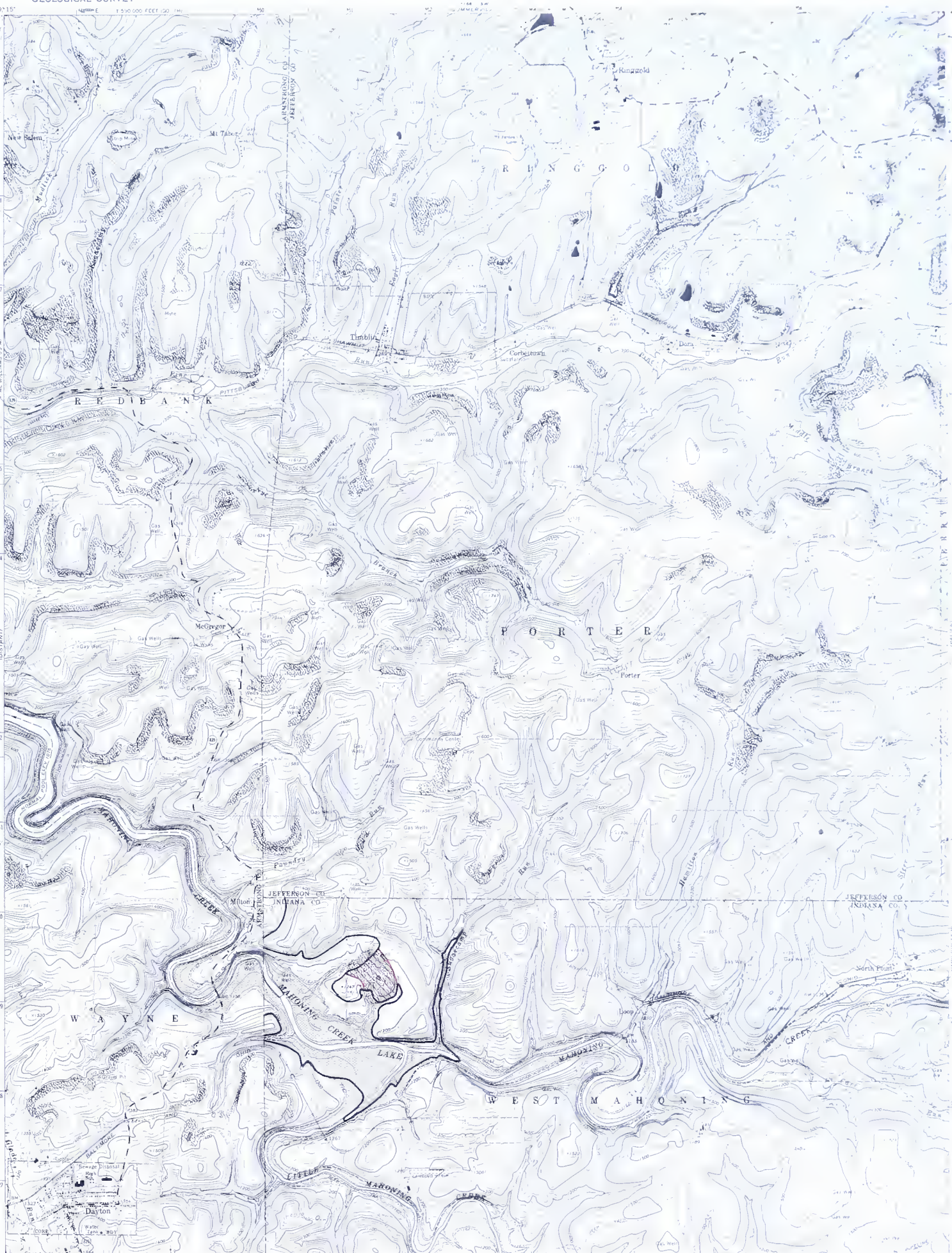
COMMODORE

EXPLANATION

Crop line of the
Lower Kittanning coal

Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate



SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic map.

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Secondary highway all weather, Lightly used all weather
hard surface, Improved surface
Unimproved road, fair or dry
weather, State Route

QUADRANGLE LOCATION

DAYTON

CROP LINE AND MINED-OUT AREA OF THE
LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Lower Freeport coal



Extent of known
deep mining



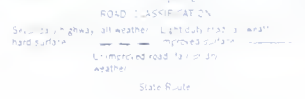
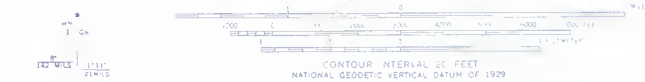
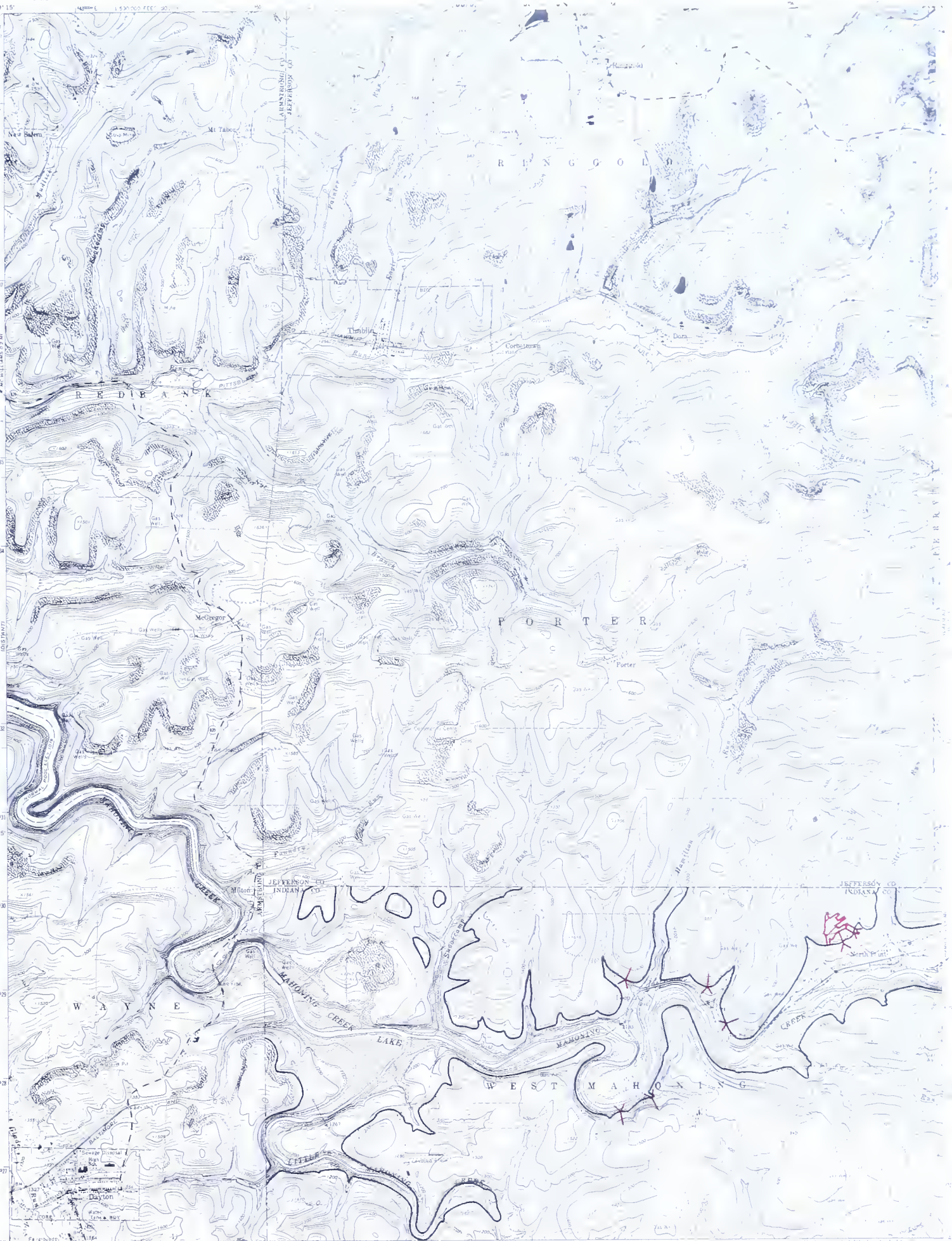
Deep-mine opening

MAP RELIABILITY

Coal crop line—good
Limits of known deep
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), using unpublished map of North Point mine supplied by James Douglas, Daybrook Coal Company.
Limits of deep mining from unpublished map supplied by Douglas.
Locations of deep-mine openings from unpublished map by Bragonier (1986) and unpublished map supplied by Douglas.



CROP LINE AND MINED-OUT AREA OF THE
LOWER FREEPORT COAL

DAYTON

EXPLANATION

Crop line of the
Upper Freeport coal



Extent of known
strip mining



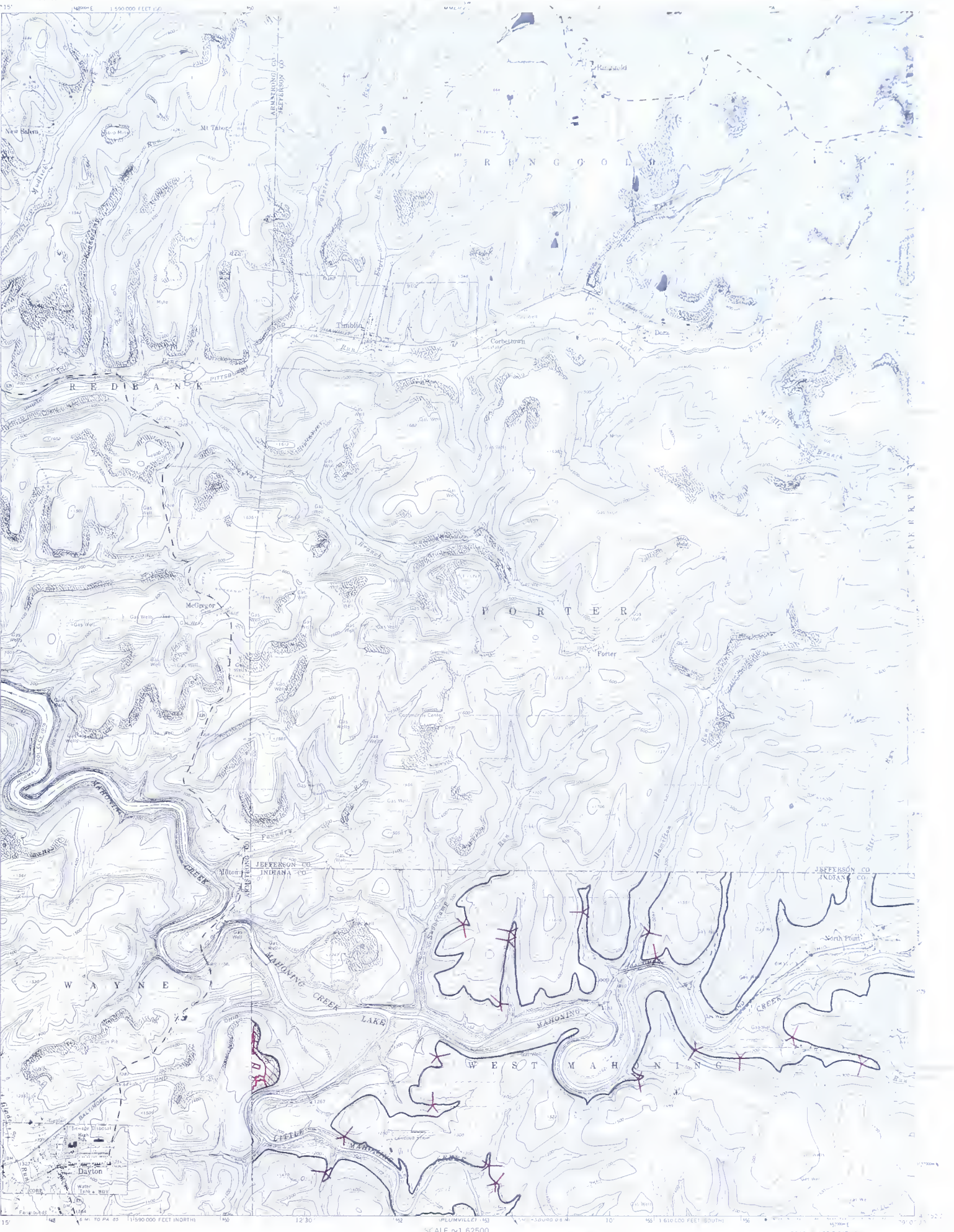
Extent of known
deep mining



Deep-mine opening

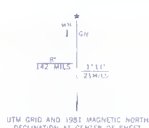
MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), using unpublished map of North Point mine supplied by James Douglas, Daybrook Coal Company. Limits of strip mining based on interpretation of topographic map. Limits of deep mining and locations of deep mine openings from unpublished maps by Bragonier (1986).






ROAD CLASSIFICATION
Secondary highway all weather Light duty road all weather
hard surface improved surface
Unimproved road fair or dry weather
State Route

DAYTON

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

EXPLANATION

CROP LINES

-  Upper Freeport coal
-  Lower Freeport coal
-  Upper Kittanning coal
-  Middle Kittanning coal
-  Lower Kittanning coal
-  Brookville coal
-  Mercer coal

-  Syncline
Showing axial-plane trace and direction of plunge.

-  Structure contour
Altitude of the base of the Lower Kittanning coal, in feet above mean sea level. Contour interval 20 feet.

- MAP RELIABILITY
Coal crop lines—good
Structure contours—good



SOURCES

Crop lines of the Upper Freeport and Lower Freeport coals modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), using unpublished map of North Point mine supplied by James Douglas, Daybrook Coal Company. Other crop lines and structure contours from unpublished map by Bragonier (1986).

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:62500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

CALEDONIA SYNCLINE

Secondary highway all weather
Light-duty road all weather
Improved surface
Unimproved road fair or dry
weather

State Route

DAYTON

COAL CROP LINES AND
STRUCTURE CONTOURS

EXPLANATION

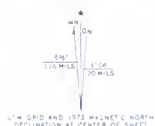


Extent of known
deep mining

MAP RELIABILITY
Limits of known deep
mining—approximate

SOURCE

Limits of deep mining from unpublished map by W. A. Bragonier,
Rochester and Pittsburgh Coal Company (1991).



MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

ELDERTON

Extent of known
deep mining

- Coal crop line—good
- Limits of known strip mining—approximate
- Limits of known deep mining—approximate

Limits of deep mining from unpublished map by Bragonier (1991).

ELDERTON

EXPLANATION

CROP LINES

—Uf—
Upper Freeport coal

—lf—
Lower Freeport coal

↗↘
Anticline
Showing axial-plane trace
and direction of plunge

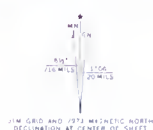
↖↗
Syncline
Showing axial-plane trace
and direction of plunge

—1000—
Structure contour
Altitude of the base of the
Upper Freeport coal, in feet
above mean sea level. Con-
tour interval 20 feet

MAP RELIABILITY
Coal crop lines—good
Structure contours—good

SOURCES

Crop lines from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Structure contours modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



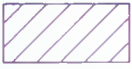
SCALE ~1:62,500
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Light blue line: Light blue
Black line: Unimproved road
Dashed line: Single track

COAL CROP LINES AND STRUCTURE CONTOURS

ELDERTON

EXPLANATION

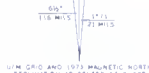


Extent of known
deep mining

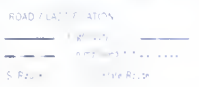
MAP RELIABILITY
Limits of known deep
mining—approximate

SOURCE

Limits of deep mining from unpublished map by W. A. Bragonier,
Rochester and Pittsburgh Coal Company (1991).



UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



MINED-OUT AREA OF THE
UPPER KITTANNING COAL

ERNEST

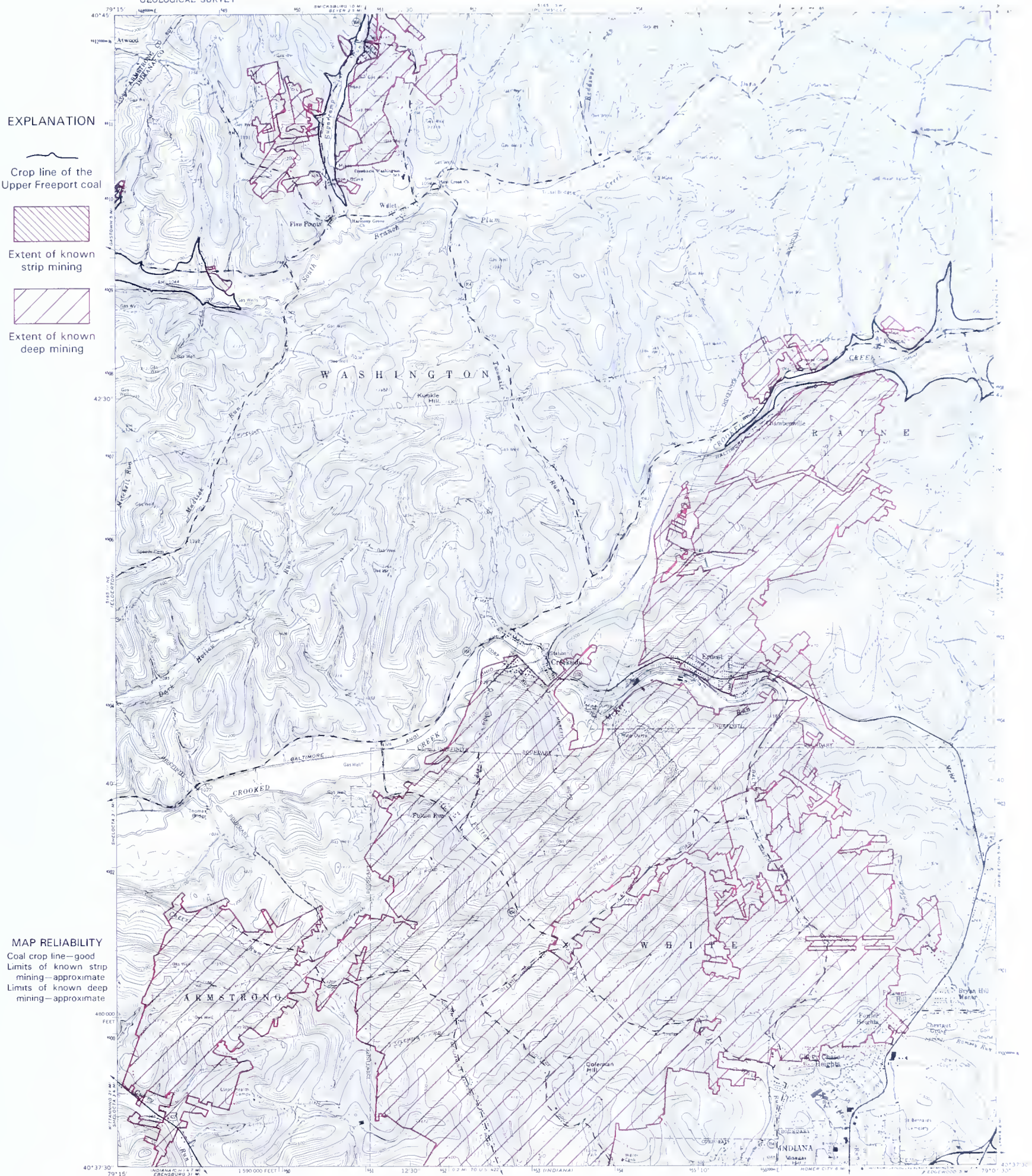
EXPLANATION

Crop line of the
Upper Freeport coal

Extent of known
strip mining

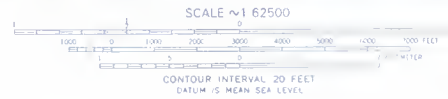
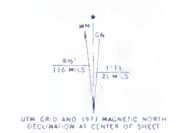
Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986).



CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

ERNEST

EXPLANATION

CROP LINES

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

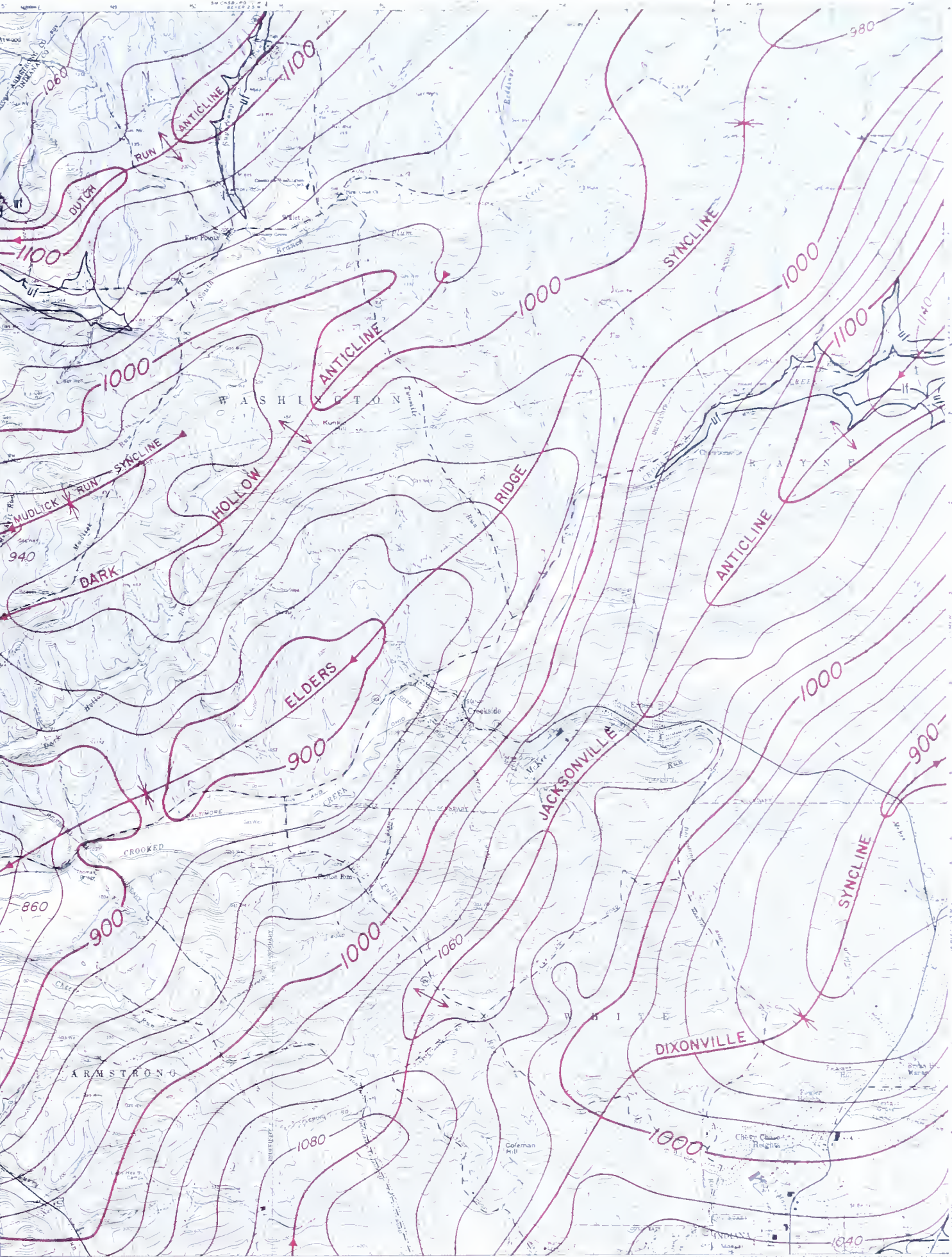
Anticline
Showing axial-plane trace
and direction of plunge.

Syncline
Showing axial-plane trace
and direction of plunge.

—1000—
Structure contour
Altitude of the base of the
Upper Freeport coal, in feet
above mean sea level. Con-
tour interval 20 feet.

MAP RELIABILITY

Coal crop lines—good
Structure contours—good



SOURCES

Crop lines from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Structure contours very slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.

IN GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

COAL CROP LINES AND STRUCTURE CONTOURS

ERNEST

EXPLANATION

Crop line of the
Lower Kittanning
coal

Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).

UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Heavy-duty ——— Light-duty ———
Medium-duty ——— Unimproved dirt
U.S. Route ——— State Route ———

INDIANA

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Lower Freeport coal

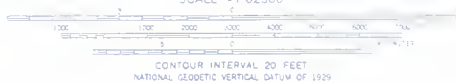
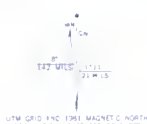


Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.



INDIANA

CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

EXPLANATION

Crop line of the
Upper Freeport coal



Extent of known
strip mining

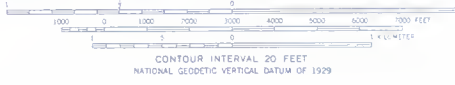
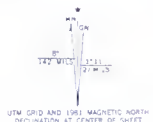


Extent of known
deep mining

MAP RELIABILITY

Coal crop line—very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES
Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished maps by Bragonier
(1986, 1991).



ROAD CLASSIFICATION	
Heavy-duty	Light-duty
Medium-duty	Unimproved dirt
U.S. Route	State Route

INDIANA

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

EXPLANATION

CROP LINES

- uf— Upper Freeport coal
- lf— Lower Freeport coal
- uk— Upper Kittanning coal
- mk— Middle Kittanning coal
- lk— Lower Kittanning coal

- Anticline
Showing axial-plane trace
and direction of plunge.

- Syncline
Showing axial-plane trace
and direction of plunge.

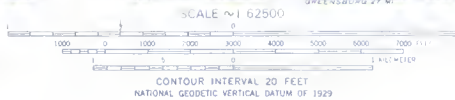
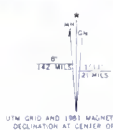
- 1000— Structure contour
Altitude of the base of the
Upper Freeport coal, in feet
above mean sea level. Con-
tour interval 20 feet.

- MAP RELIABILITY
Coal crop lines—good to
very good
Structure contours—good



SOURCES

Crop line of the Lower Freeport coal slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Other crop lines from unpublished map by Bragonier (1986).
Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



INDIANA BASIN
PENNSYLVANIA, INDIANA
5-MINUTE SERIES TOPOGRAPHIC

- Heavy duty
- Medium duty
- Light duty
- Unimproved dirt
- U.S. Route
- State Route

INDIANA

COAL CROP LINES AND
STRUCTURE CONTOURS

Extent of known
deep mining

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map from U.S. Bureau of Mines.

INDIANA 10 M.

SCALE $\sim 1:62500$

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, all weather hard surface	Light duty road, all weather improved surface
Secondary highway, all weather hard surface	Unimproved road, fair or dry weather

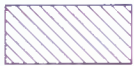
☐ U.S. Route ☐ State Route

MARION CENTER

CROP LINE AND MINED-OUT AREAS OF THE LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Middle Kittanning
coal



Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

122° 11' 15" W
79° 07' 30" N



CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway	weather	Light duty road	weather
hard surface		improved surface	
Secondary highway	weather	Unimproved road	fair or dry
hard surface		weather	
U.S. Route		State Route	

MARION CENTER

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

EXPLANATION

Crop line of the
Upper Kittanning
coal



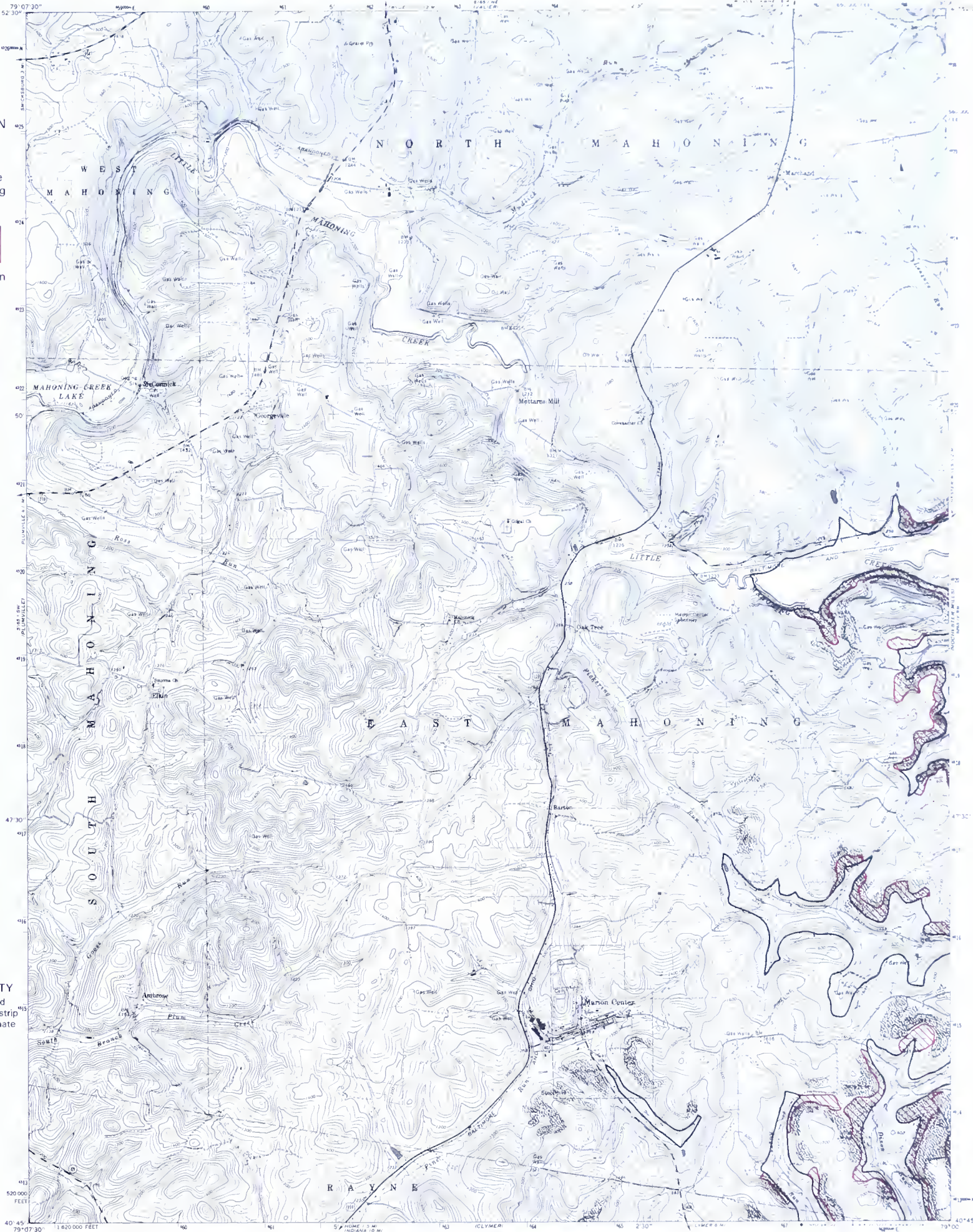
Extent of known
strip mining

MAP RELIABILITY

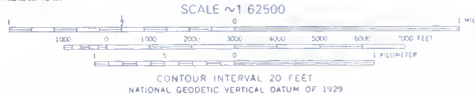
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.



UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



ROAD CLASSIFICATION	
Primary highway, all-weather hard surface	Light duty road, all-weather improved surface
Secondary highway, all-weather hard surface	Unimproved road, fair or dry weather
U.S. Route	State Route



MARION CENTER

CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

EXPLANATION

Crop line of the
Lower Freeport coal



Extent of known
strip mining



Extent of known
deep mining

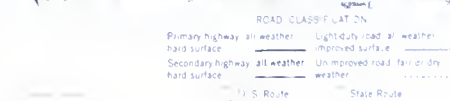
MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).

UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



MARION CENTER

CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

EXPLANATION

Crop line of the
Upper Freeport coal



Extent of known
strip mining



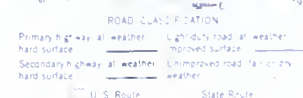
Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).



MARION CENTER

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

EXPLANATION

CROP LINES

- uf— Upper Freeport coal
- lf— Lower Freeport coal
- uk— Upper Kittanning coal
- mk— Middle Kittanning coal
- lk— Lower Kittanning coal

- Anticline
Showing axial plane trace and direction of plunge.

- Syncline
Showing axial plane trace and direction of plunge.

- 1200— Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.

- MAP RELIABILITY
Coal crop lines—good
Structure contours—good

SOURCES

Crop line of the Upper Kittanning coal slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Other crop lines from unpublished map by Bragonier (1986).
Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.

1:50,000 SCALE
1:50,000 SCALE

SCALE 1:62,500

CONTOUR INTERVAL 20 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

- Primary highway at weather hard surface
- Secondary highway at weather hard surface
- Light duty road at weather improved surface
- Unimproved road fair or dry weather
- U.S. Route
- State Route

MARION CENTER

COAL CROP LINES AND STRUCTURE CONTOURS

EXPLANATION

- Crop line of the
Brookville coal
- Extent of known
strip mining
- Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).

CROP LINE AND MINED-OUT AREAS OF THE
BROOKVILLE COAL

McGEES MILLS

Crop line of the Clarion coal

Extent of known strip mining

This is a detailed topographic map of the Gaskill area in Jefferson County, Indiana. The map features contour lines indicating elevation, with major peaks reaching over 2000 feet. Key geographical features include the Gaskill River, which flows through the center of the map, and the Big Run, which is located in the upper left. The map also shows several roads, including the main highway running horizontally across the middle. Notable locations include Bakersville, Hillman, and Johnsonburg. The map is divided into sections by a vertical line, likely representing a county boundary. The title 'GASKILL' is prominently displayed in the center. The map is labeled with 'JEFFERSON CO. INDIANA CO.' and 'STATE GAME LANDS NO. 195' and 'STATE GAME LANDS NO. 174'. The map is a black and white reproduction of a topographic map, showing contour lines, roads, and various geographical features. The map is oriented with North at the top. The map is a detailed topographic map of the Gaskill area in Jefferson County, Indiana. The map features contour lines indicating elevation, with major peaks reaching over 2000 feet. Key geographical features include the Gaskill River, which flows through the center of the map, and the Big Run, which is located in the upper left. The map also shows several roads, including the main highway running horizontally across the middle. Notable locations include Bakersville, Hillman, and Johnsonburg. The map is divided into sections by a vertical line, likely representing a county boundary. The title 'GASKILL' is prominently displayed in the center. The map is labeled with 'JEFFERSON CO. INDIANA CO.' and 'STATE GAME LANDS NO. 195' and 'STATE GAME LANDS NO. 174'. The map is a black and white reproduction of a topographic map, showing contour lines, roads, and various geographical features. The map is oriented with North at the top. The map is a detailed topographic map of the Gaskill area in Jefferson County, Indiana. The map features contour lines indicating elevation, with major peaks reaching over 2000 feet. Key geographical features include the Gaskill River, which flows through the center of the map, and the Big Run, which is located in the upper left. The map also shows several roads, including the main highway running horizontally across the middle. Notable locations include Bakersville, Hillman, and Johnsonburg. The map is divided into sections by a vertical line, likely representing a county boundary. The title 'GASKILL' is prominently displayed in the center. The map is labeled with 'JEFFERSON CO. INDIANA CO.' and 'STATE GAME LANDS NO. 195' and 'STATE GAME LANDS NO. 174'. The map is a black and white reproduction of a topographic map, showing contour lines, roads, and various geographical features. The map is oriented with North at the top.

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.

UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62,500

CONTOUR INTERVAL 20 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway all weather hard surface	Light-duty road all weather improved surface
Secondary highway all weather hard surface	Unimproved road fair or dry weather

☐ Interstate Route ☐ U.S. Route ☐ State Route

McGEES MILLS

CROP, LINE AND MINED-OUT AREAS OF THE CLARION COAL

EXPLANATION

Crop line of the
Lower Kittanning coal

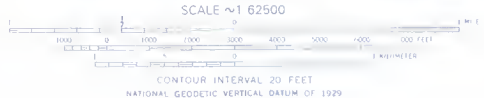
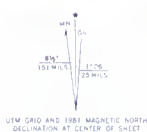


Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.



ROAD CLASSIFICATION	
Primary highway all weather hard surface	Light duty road all weather improved surface
Secondary highway all weather hard surface	Unimproved road, lay or dry weather
Interstate Route	U. S. Route
	State Route

McGEES MILLS

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Middle Kittanning
coal

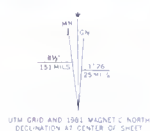


Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.



SCALE ~1:62500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Primary highway all-weather hard surface
Secondary highway all-weather hard surface
Light-duty road all-weather improved surface
Unimproved road fair or dry weather
Interstate Route
U.S. Route
State Route

CROP LINE AND MINED-OUT AREA OF THE
MIDDLE KITTANNING COAL

McGEES MILLS

EXPLANATION

Crop line of the
Upper Kittanning
coal



Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.

11M GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:62500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Primary highway at weather light-colored at weather
hard surface improved surface
Secondary highway at weather weather
hard surface unimproved road fair or dry
weather
Interstate Route U. S. Route State Route

CROP LINE AND MINED-OUT AREA OF THE
UPPER KITTANNING COAL

McGEES MILLS

Extent of known
strip mining

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic map.

Limits of strip mining based on interpretation of topographic map.

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET.

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway all weather hard surface	Light-duty road all weather improved surface
Secondary highway all weather hard surface	Unimproved road fair or dry weather

☐ Interstate Route ☐ U.S. Route ☐ State Route

CROP LINE AND MINED-OUT AREAS OF THE UPPER FREEPORT COAL

EXPLANATION

CROP LINES

- Upper Freeport coal
- Lower Freeport coal
- Upper Kittanning coal
- Middle Kittanning coal
- Lower Kittanning coal
- Clarion coal
- Brookville coal
- Mercer coal



Anticline

Showing axial-plane trace and direction of plunge.

—2000—

Structure contour

Altitude of the base of the Lower Freeport coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY
Coal crop lines—good
Structure contours—good

SOURCES

Crop lines of the Brookville and Mercer coals modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Crop lines of the Upper Freeport and Middle Kittanning coals from unpublished map by Bragonier (1986).
Other crop lines slightly modified by A. D. Glover from unpublished map by Bragonier (1986) based on interpretation of topographic map.
Structure contours from unpublished map by Bragonier (1986).

COAL CROP LINES AND STRUCTURE CONTOURS

McGEES MILLS



ROAD CLASSIFICATION
Primary highway a weather hard surface
Secondary highway a weather improved surface
Tertiary highway a weather
Interstate Route S. Route State Route

EXPLANATION

Crop line of the
Middle Kittanning
coal

Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good to
very good
Limits of strip mining—approximate

SOURCES
Crop line slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map
and unpublished information from Rochester and Pittsburgh Coal
Company (1991).

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Heavy duty Light duty
Medium duty Unimproved dirt
State Route

PENNSYLVANIA
QUADRANGLE LOCATION

McINTYRE

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

EXPLANATION

- Crop line of the
Upper Kittanning coal
- Extent of known
strip mining
- Extent of known
deep mining

- MAP RELIABILITY
Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES
Crop line slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished maps by Bragonier
(1986, 1991).

CROP LINE AND MINED OUT AREAS OF THE
UPPER KITTANNING COAL



UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Heavy-duty Light-duty
Med. un. duty Un. improved dirt
State Route

McINTYRE

EXPLANATION

Crop line of the
Upper Freeport coal



Extent of known
strip mining



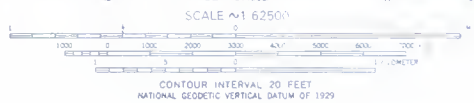
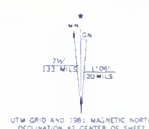
Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished maps by Bragonier
(1986, 1991).



CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

McINTYRE

EXPLANATION

- Crop line of the
Pittsburgh coal
- Extent of known
strip mining
- Extent of known
deep mining

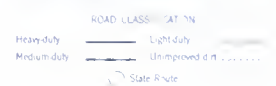
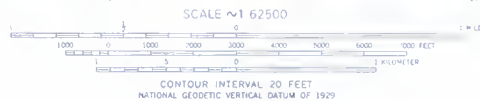
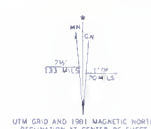
MAP RELIABILITY

- Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map, unpublished map from Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation (1982), and unpublished data from Rochester and Pittsburgh Coal Company (1991). Limits of deep mining from unpublished map by Bragonier (1986).



McINTYRE
QUADRANGLE LOCATION

CROP LINE AND MINED-OUT AREAS OF THE
PITTSBURGH COAL

McINTYRE

EXPLANATION

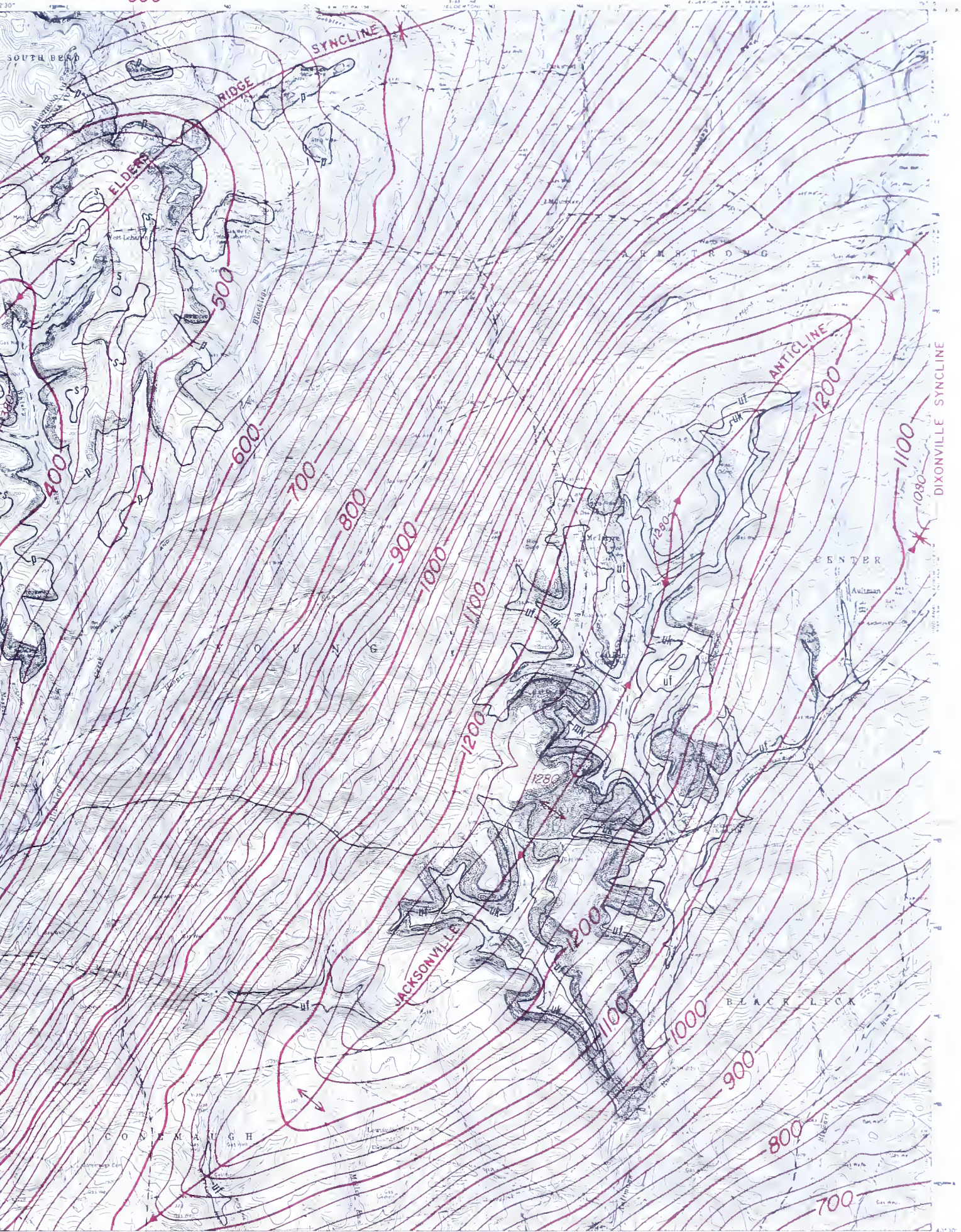
CROP LINES

-  Sewickley coal
-  Pittsburgh coal
-  Upper Freeport coal
-  Upper Kittanning coal
-  Middle Kittanning coal

-  Anticline
Showing axial-plane trace
and direction of plunge.
-  Syncline
Showing axial-plane trace
and direction of plunge.

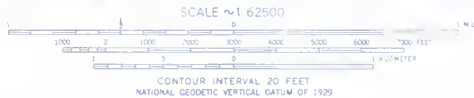
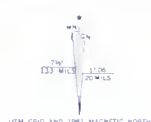
-  Structure contour
Altitude of the base of the
Upper Freeport coal, in feet
above mean sea level. Con-
tour interval 20 feet.

- MAP RELIABILITY
Coal crop lines—good to
very good
Structure contours—good



SOURCES

Crop line of the Sewickley coal based on unpublished data. Other crop lines slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



ROAD CLASSIFICATION	
Heavy-duty	Light-duty
Medium-duty	Unimproved dirt
	State Road

McINTYRE

COAL CROP LINES AND STRUCTURE CONTOURS

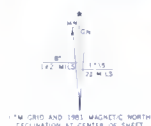
EXPLANATION

- Crop line of the
Brookville coal
- Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.



CROP LINE AND MINED-OUT AREAS OF THE
BROOKVILLE COAL

NEW FLORENCE



EXPLANATION

Crop line of the
Lower Kittanning coal

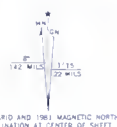
Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).



CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

NEW FLORENCE

EXPLANATION

Crop line of the
Middle Kittanning
coal

Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:62500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Main Road
Minor Road
U.S. Route
State Route

PENNSYLVANIA
QUADRANGLE LOCATION

NEW FLORENCE

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

EXPLANATION

Crop line of the
Upper Kittanning
coal

Extent of known
strip mining

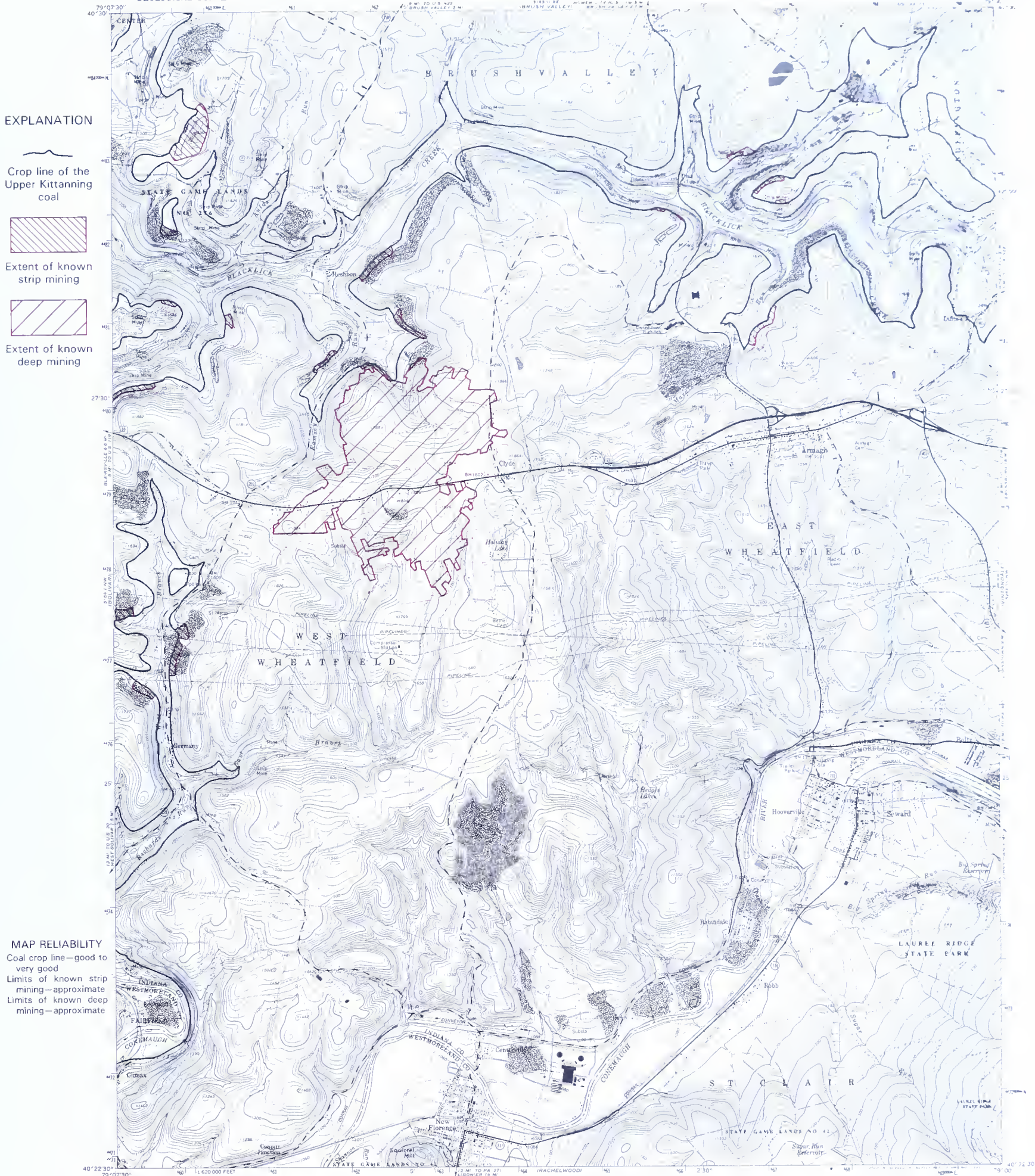
Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished maps by Bragonier
(1986, 1991).

CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL



UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Heavy duty ——— Light duty ———
Medium duty ——— Unimproved dirt ———
U.S. Route ——— State Route ———

PENNSYLVANIA
QUADRANGLE LOCATION

NEW FLORENCE

EXPLANATION

Crop line of the
Lower Freeport coal



Extent of known
strip mining



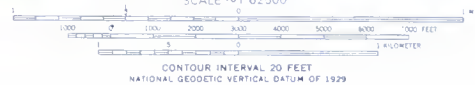
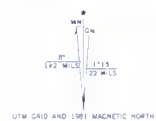
Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop lines slightly modified by A. D. Glover from unpublished
map by W. A. Bragonier, Rochester and Pittsburgh Coal Com-
pany (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished maps by Bragonier
(1986, 1991).



NEW FLORENCE

CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

EXPLANATION

Crop line of the
Upper Freeport coal

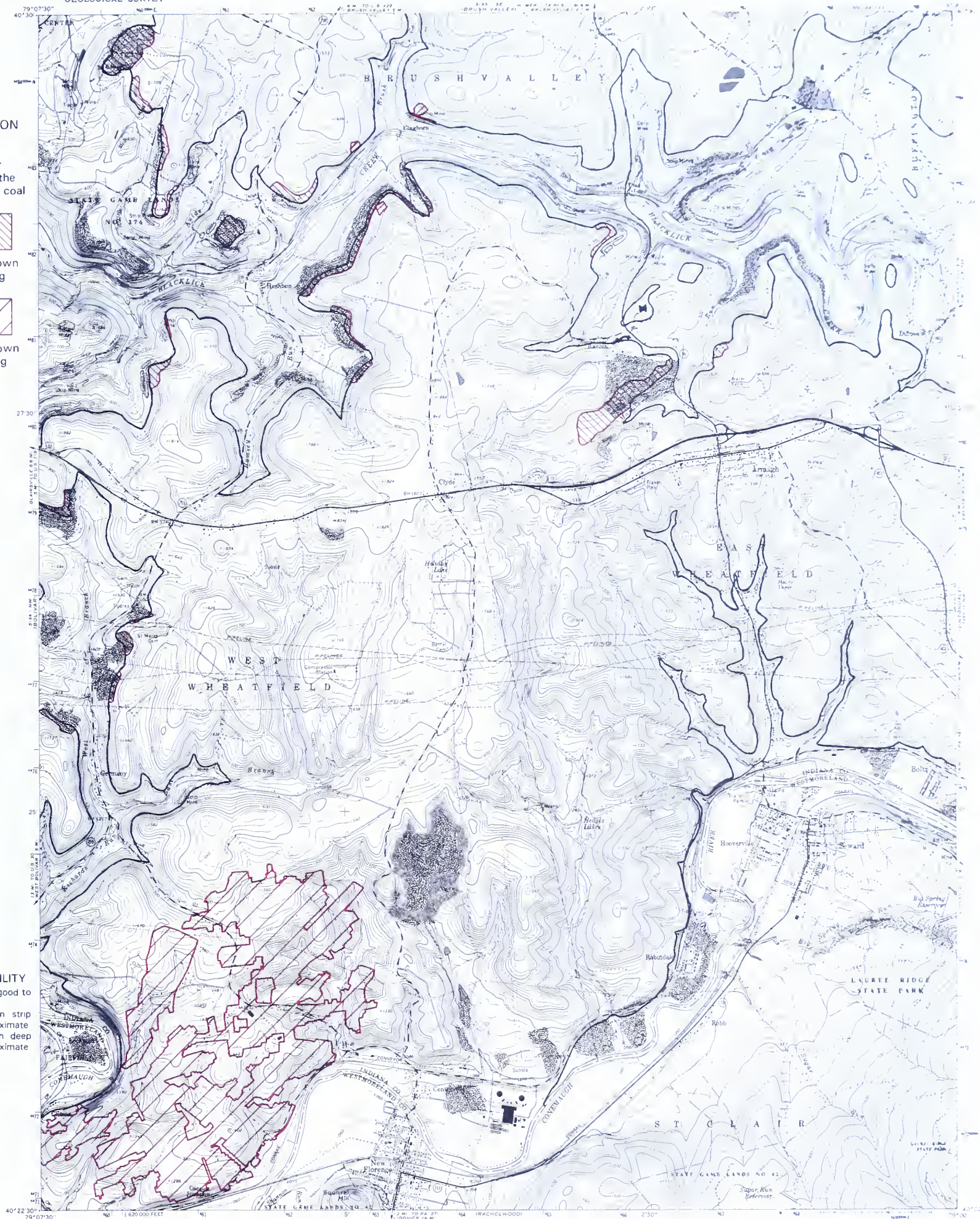


Extent of known
strip mining



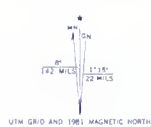
Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map. Limits of deep mining from unpublished maps by Bragonier (1986, 1991).



ROAD CLASSIFICATION
Heavy duty
Medium duty
Light duty
Unimproved dirt
U.S. Route
State Route

NEW FLORENCE

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

EXPLANATION

CROP LINES

- mh— Mahoning coal
- uf— Upper Freeport coal
- lf— Lower Freeport coal
- uk— Upper Kittanning coal
- mk— Middle Kittanning coal
- lk— Lower Kittanning coal
- bk— Brookville coal
- mr— Mercer coal

Anticline

Showing axial-plane trace and direction of plunge.

Syncline

Showing axial-plane trace and direction of plunge.

—1300—
Structure contour
Altitude of the base of the Lower Kittanning coal, in feet above mean sea level. Contour interval 20 feet

MAP RELIABILITY
Coal crop lines—good to very good
Structure contours—good to very good

SOURCES

Crop lines slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.

UTM GRID AND 1981 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

- Heavy-duty
- Medium-duty
- Light-duty
- Unimproved dirt
- U.S. Route
- State Route

NEW FLORENCE

COAL CROP LINES AND
STRUCTURE CONTOURS

EXPLANATION

Crop line of the
Upper Freeport coal

Extent of known
strip mining

Extent of known
deep mining

Deep-mine opening

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining and locations of deep-mine openings from
unpublished map by Bragonier (1986).

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

PLUMVILLE

EXPLANATION

CROP LINES

Upper Freeport coal

Lower Freeport coal



Anticline
Showing axial-plane trace
and direction of plunge



Syncline
Showing axial-plane trace
and direction of plunge

Structure contour
Altitude of the base of the
Upper Freeport coal, in feet
above mean sea level. Con-
tour interval 20 feet.

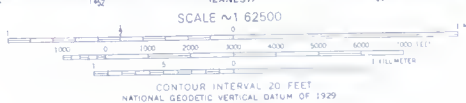
MAP RELIABILITY

Coal crop lines—good
Structure contours—good

SOURCES

Crop lines from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Structure contours very slightly modified by A. D. Glover from
unpublished map by Bragonier (1986) using unpublished data.

UTM GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



ROAD CLASSIFICATION
Secondary highway all-weather, Light-duty road all-weather
hard surface, Improved surface
Unimproved road fair or dry
weather, Poor
State Route

PLUMVILLE

COAL CROP LINES AND
STRUCTURE CONTOURS

EXPLANATION

Crop line of the
Upper Freeport coal

Extent of known
strip mining

Extent of known
deep mining

MAP RELIABILITY

Coal crop line—very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map. Limits of deep mining from unpublished map by Bragonier (1986).

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Primary highway all weather hard surface
Secondary highway all weather hard surface
Light-duty road all weather improved surface
Unimproved road fair or dry weather
U.S. Route
State Route

PUNXSUTAWNEY

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

EXPLANATION

CROP LINES

- Upper Freeport coal
- Lower Freeport coal
- Upper Kittanning coal
- Middle Kittanning coal
- Lower Kittanning coal

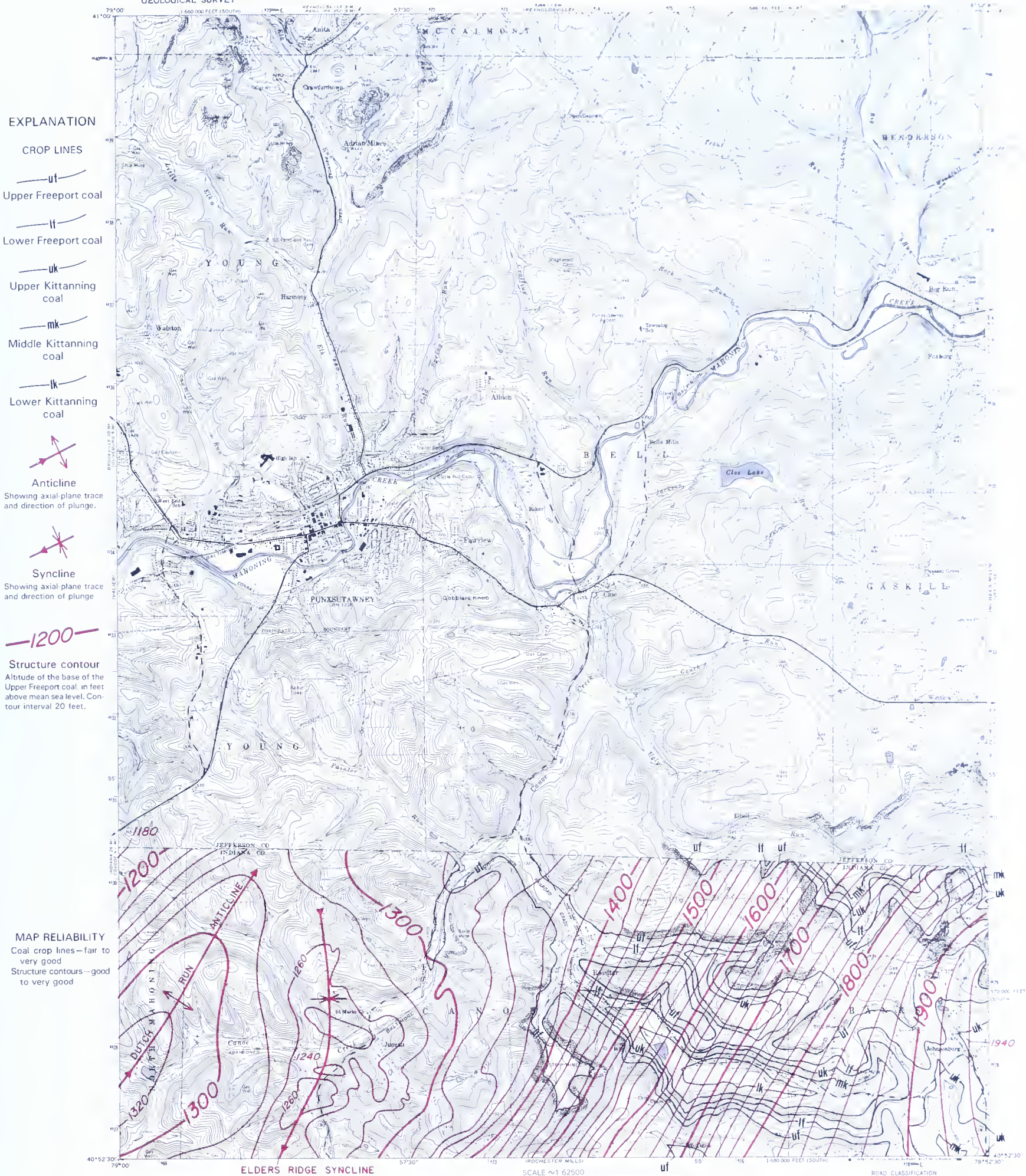
- Anticline
Showing axial-plane trace and direction of plunge.
- Syncline
Showing axial-plane trace and direction of plunge

- Structure contour
Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.

- MAP RELIABILITY
Coal crop lines—fair to very good
Structure contours—good to very good

SOURCES

Crop line of the Upper Freeport coal slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Other crop lines from unpublished map by Bragonier (1986).
Structure contours very slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



ELDERS RIDGE SYNCLINE

SCALE 1:62,500

CONTOUR INTERVAL 20 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

- ROAD CLASSIFICATION
- Primary highway, all weather
- Secondary highway, all weather
- Light duty road, all weather
- Improved surface
- Unimproved road, all weather
- Unimproved road, all weather
- U. S. Route
- State Route

PUNXSUTAWNEY

COAL CROP LINES AND
STRUCTURE CONTOURS

EXPLANATION



Syncline

Showing axial-plane trace
and direction of plunge.



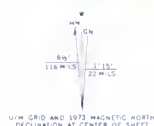
Structure contour
Altitude of the base of the
Lower Kittanning coal, in
feet above mean sea level.
Contour interval 20 feet

MAP RELIABILITY

Structure contours—fair
to good

SOURCES

Structure contours by A. D. Glover (based on extension of structure contours in adjacent areas (unpublished maps by W. A. Bragonier, Rochester and Pittsburgh Coal Company [1986], and Skema, V. W. [1988], *Coal resources of Westmoreland County, Pennsylvania—Part 1, Coal crop lines, mined out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 94, Pt. 1, p. 98).



STRUCTURE CONTOURS

RACHELWOOD

EXPLANATION

- Crop line of the Brookville coal
- ▨ Extent of known strip mining
- Y Deep-mine opening

MAP RELIABILITY
Coal crop line—good to very good
Limits of known strip mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map.
Location of deep-mine opening from unpublished map by Bragonier (1986).

UTM GRID AND 1983 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:62,500

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

Primary highway all weather, hard surface

Light-duty road all weather, improved surface

Secondary highway all weather, hard surface

Unimproved road fair or dry weather

State Route

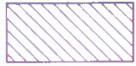
PENNSYLVANIA
QUADRANGLE LOCATION

ROCHESTER MILLS

CROP LINE AND MINED-OUT AREAS OF THE
BROOKVILLE COAL

EXPLANATION

Crop line of the
Lower Kittanning coal



Extent of known
strip mining



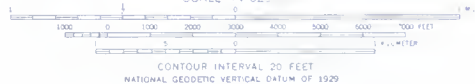
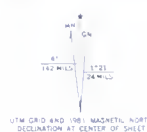
Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986)
and unpublished map from U.S. Bureau of Mines.



Primary highway all weather hard surface	Light-duty road all weather improved surface
Secondary highway all weather hard surface	Unimproved road fair or dry weather
	State Route



ROCHESTER MILLS

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Middle Kittanning coal

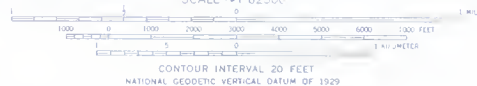
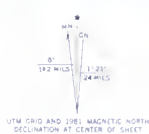


Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.



ROAD CLASSIFICATION
Primary highway all-weather, light-duty road all-weather, hard surface, improved surface
Secondary highway all-weather, Unimproved road, fair or dry, hard surface, weather
State Route



ROCHESTER MILLS

CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL

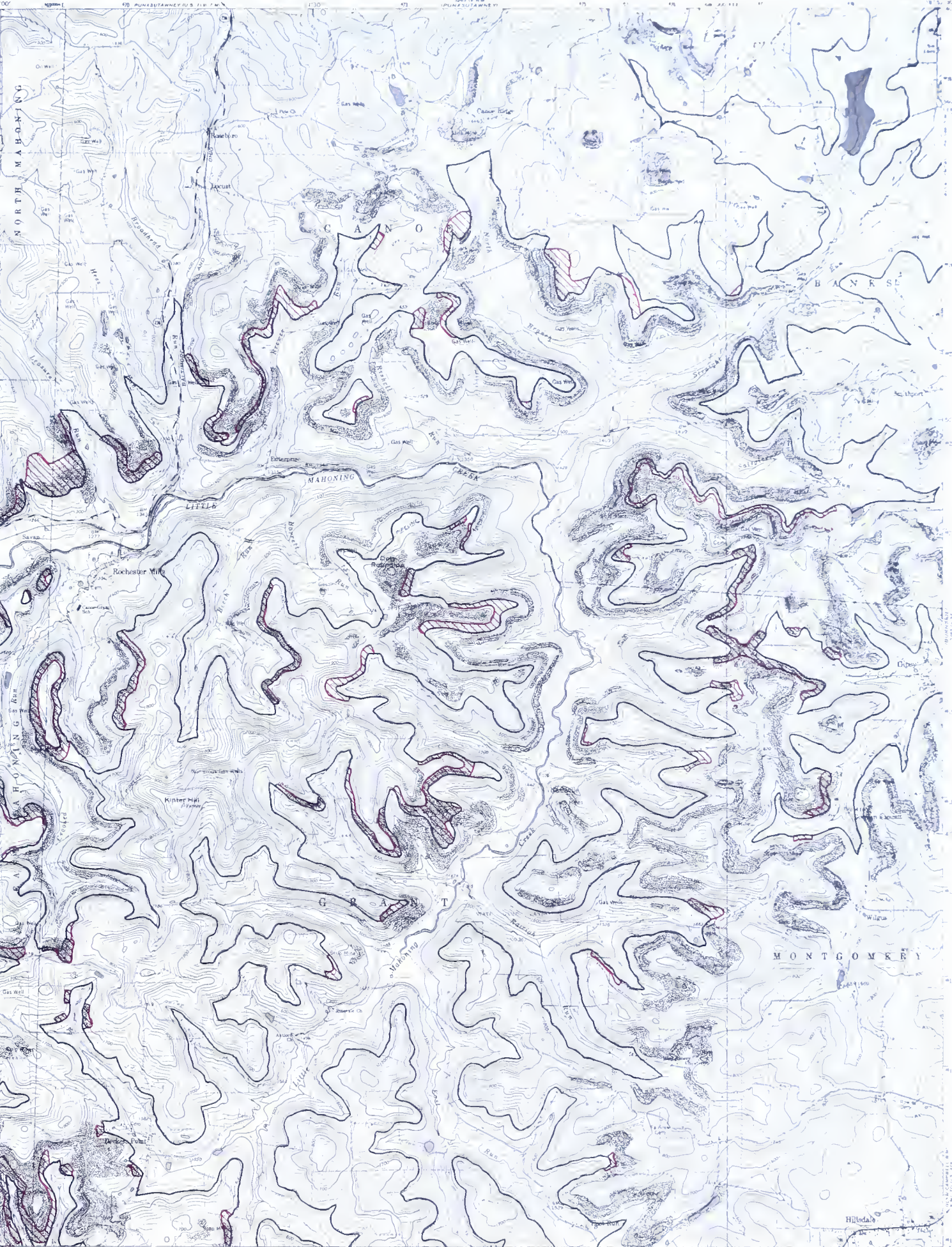
EXPLANATION

Crop line of the
Upper Kittanning
coal



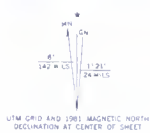
Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate



SOURCES

Crop line modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map.



ROCHESTER MILLS

CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

EXPLANATION

Crop line of the
Lower Freeport coal

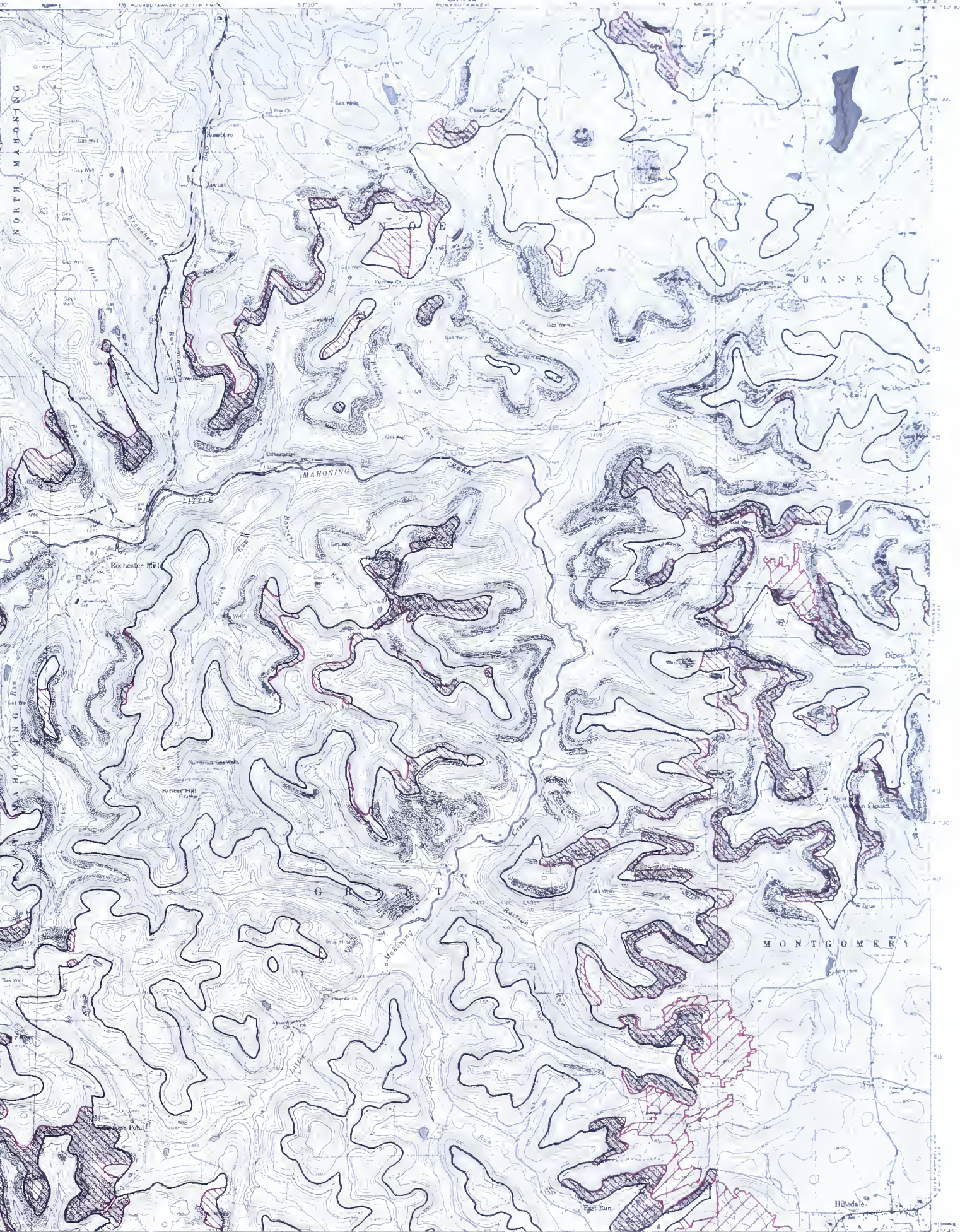


Extent of known
strip mining



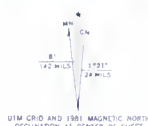
Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986).



SCALE 1:62,500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Primary highway, all weather hard surface
Secondary highway, all weather hard surface
Light-duty road, all weather unpaved surface
Unimproved road, fair or dry weather
State Route



CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

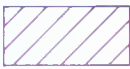
ROCHESTER MILLS

EXPLANATION

Crop line of the
Upper Freeport coal



Extent of known
strip mining

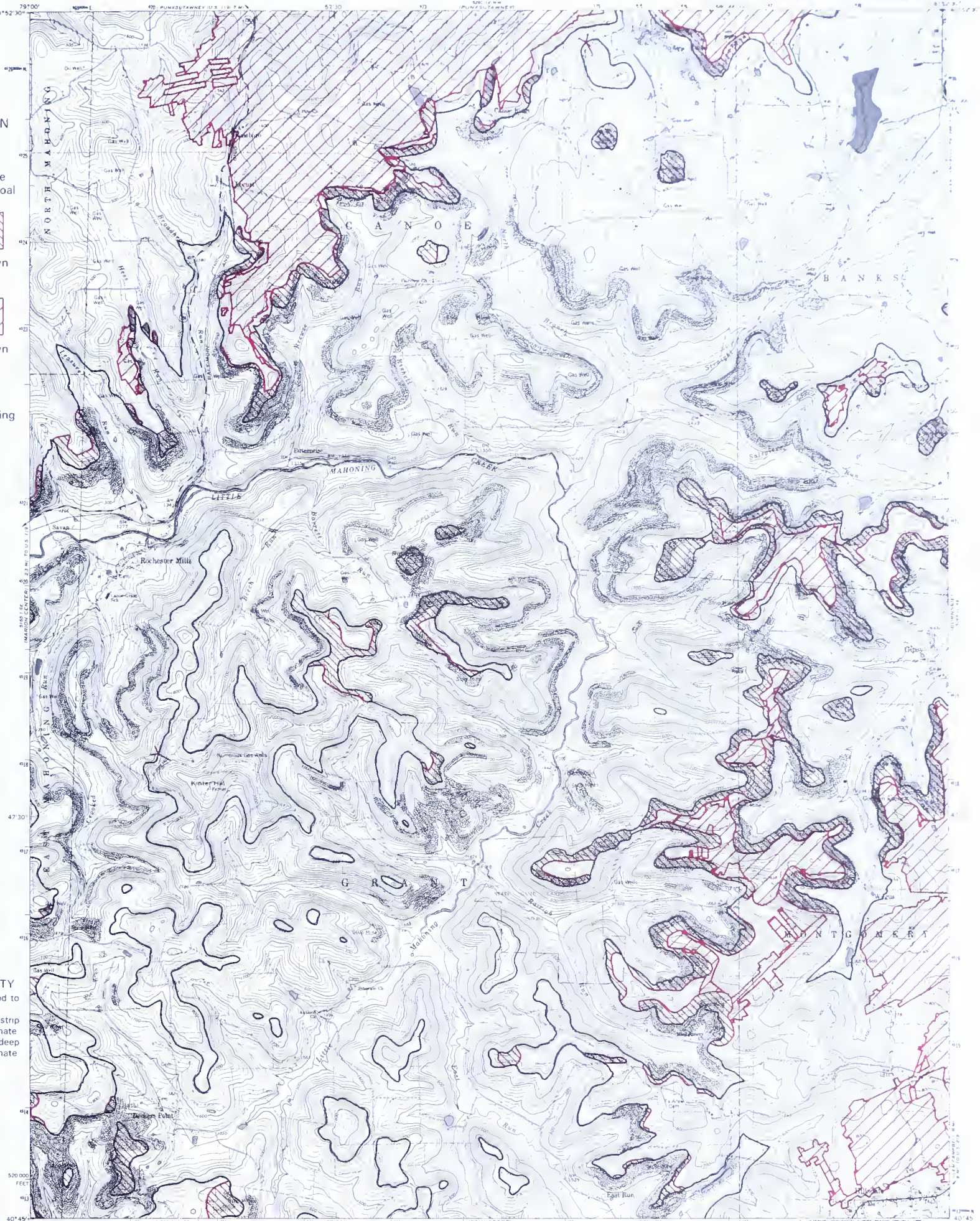


Extent of known
deep mining

Deep-mine opening

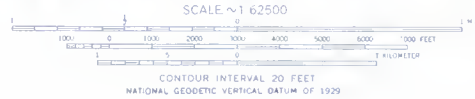
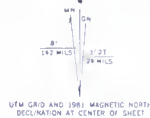
MAP RELIABILITY

Coal crop line—good to
very good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line modified by A. D. Glover from unpublished map by
W. A. Bragonier, Rochester and Pittsburgh Coal Company
(1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining and location of deep-mine opening from
unpublished map by Bragonier (1986).



ROAD CLASSIFICATION	
Primary highway all weather	Light duty road all weather
hard surface	improved surface
Secondary highway all weather	Unimproved road fair or dry
weather	weather
	Slate Route



ROCHESTER MILLS

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

EXPLANATION

CROP LINES

—mh—
Mahoning coal

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lk—
Lower Kittanning coal

—bk—
Brookville coal

—mr—
Mercer coal

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lk—
Lower Kittanning coal

—bk—
Brookville coal

—mr—
Mercer coal

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lk—
Lower Kittanning coal

—bk—
Brookville coal

—mr—
Mercer coal

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lk—
Lower Kittanning coal

—bk—
Brookville coal

—mr—
Mercer coal

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lk—
Lower Kittanning coal

—bk—
Brookville coal

—mr—
Mercer coal

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lk—
Lower Kittanning coal

—bk—
Brookville coal

—mr—
Mercer coal

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lk—
Lower Kittanning coal

—bk—
Brookville coal

—mr—
Mercer coal

—uf—
Upper Freeport coal

—lf—
Lower Freeport coal

—uk—
Upper Kittanning coal

—mk—
Middle Kittanning coal

—lk—
Lower Kittanning coal

—bk—
Brookville coal

—mr—
Mercer coal

—uf—
Upper Freeport coal

Anticline

Showing axial-plane trace and direction of plunge.

—1800—

Structure contour

Altitude of the base of the Upper Freeport coal, in feet above mean sea level. Contour interval 20 feet.

MAP RELIABILITY

Coal crop lines—good to very good

Structure contours—good

SOURCES

Crop line of the Brookville coal slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.

Other crop lines modified by A. D. Glover from unpublished map by Bragonier (1986) based on interpretation of topographic map. Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.

111M UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
Primary highway, all weather
Secondary highway, all weather
Light-duty road, all weather
Unimproved road, fair or dry weather
State Route

PENNSYLVANIA
QUADRANGLE LOCATION

ROCHESTER MILLS

COAL CROP LINES AND
STRUCTURE CONTOURS

EXPLANATION

Crop line of the
Upper Kittanning
coal



Extent of known
strip mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.

17°M GRID AND 1975 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



QUAL CLASSIFICATION

Light gray
Dark gray
Brown
Blue

SALTSBURG

**CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL**

EXPLANATION

Crop line of the
Lower Freeport coal



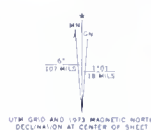
Extent of known
strip mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.



ROAD CLASSIFICATION	
Heavy duty	Light duty
Medium duty	Unimproved dirt
U.S. Route	State Route

SALTSBURG

**CROP LINE AND MINED-OUT AREA OF THE
LOWER FREEPORT COAL**

EXPLANATION

Crop line of the
Upper Freeport coal



Extent of known
strip mining



Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map. Limits of deep mining from unpublished maps by Bragonier (1986, 1991) and unpublished map from Tunnelton Mining Company (1991).

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL

SALTSBURG

EXPLANATION

CROP LINES

Upper Freeport coal

Lower Freeport coal

Upper Kittanning coal

Anticline
Showing axial-plane trace
and direction of plunge.

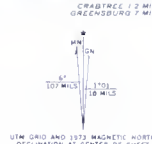
Structure contour
Altitude of the base of the
Upper Freeport coal, in feet
above mean sea level. Con-
tour interval 20 feet

MAP RELIABILITY
Coal crop lines—good
Structure contours—good



SOURCES

Crop lines slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



SALTSBURG

**COAL CROP LINES AND
STRUCTURE CONTOURS**

EXPLANATION

Crop line of the
Lower Kittanning
coal

Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known deep
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of deep mining from unpublished map by Bragonier (1986).

UTM GRID AND 1972 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62500
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

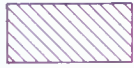
ROAD CLASSIFICATION
Heavy-duty Light-duty
Medium-duty Unimproved d.r.
U.S. Route State Route

STRONGSTOWN

CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Middle Kittanning
coal

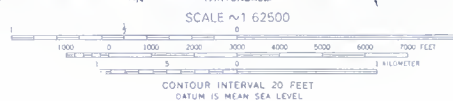
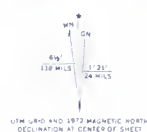


Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.



ROAD CLASSIFICATION
Heavy-duty ——— Light-duty - - - - -
Medium-duty ——— Unimproved dirt
U.S. Route □ State Route ○

STRONGSTOWN

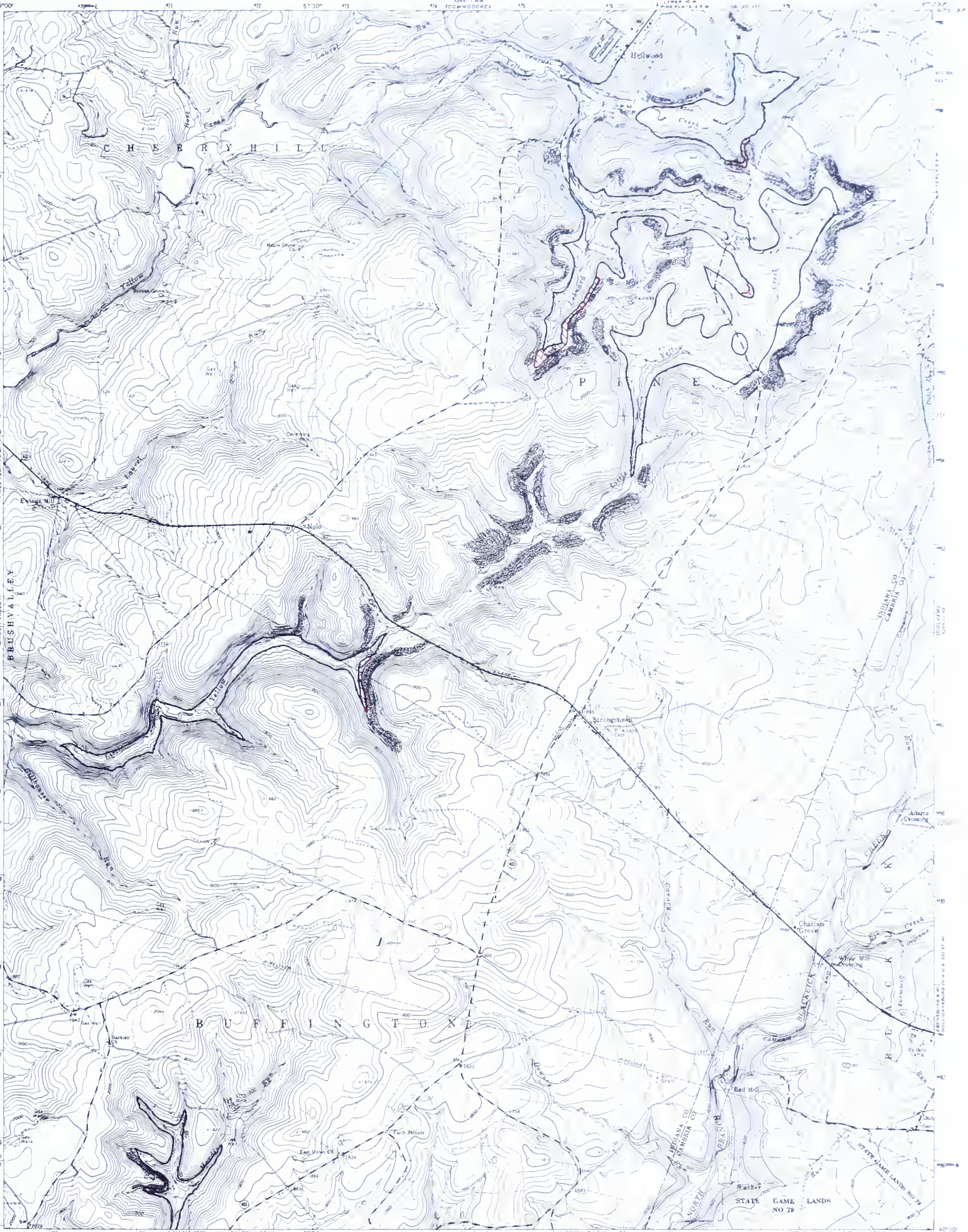
**CROP LINE AND MINED-OUT AREAS OF THE
MIDDLE KITTANNING COAL**

EXPLANATION

Crop line of the
Upper Kittanning
coal

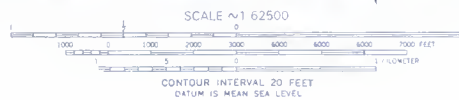
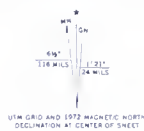
Extent of known
strip mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate



SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.



CROP LINE AND MINED-OUT AREAS OF THE
UPPER KITTANNING COAL

STRONGSTOWN

EXPLANATION

Crop line of the
Lower Freeport coal



Extent of known
strip mining



Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.
Limits of deep mining from unpublished map by Bragonier (1986).

U.S. GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE ~1:62,500
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

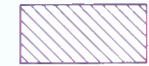
ROAD CLASSIFICATION
Heavy-duty ——— Light-duty ———
Not-improved ——— Unimproved dirt ———
U.S. Route ——— State Route ———

CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

STRONGTOWN

EXPLANATION

Crop line of the
Upper Freeport coal



Extent of known
strip mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate

SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester
and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic
map.

UTM GRID AND 1972 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET



STRONGTOWN

**CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL**

EXPLANATION

CROP LINES

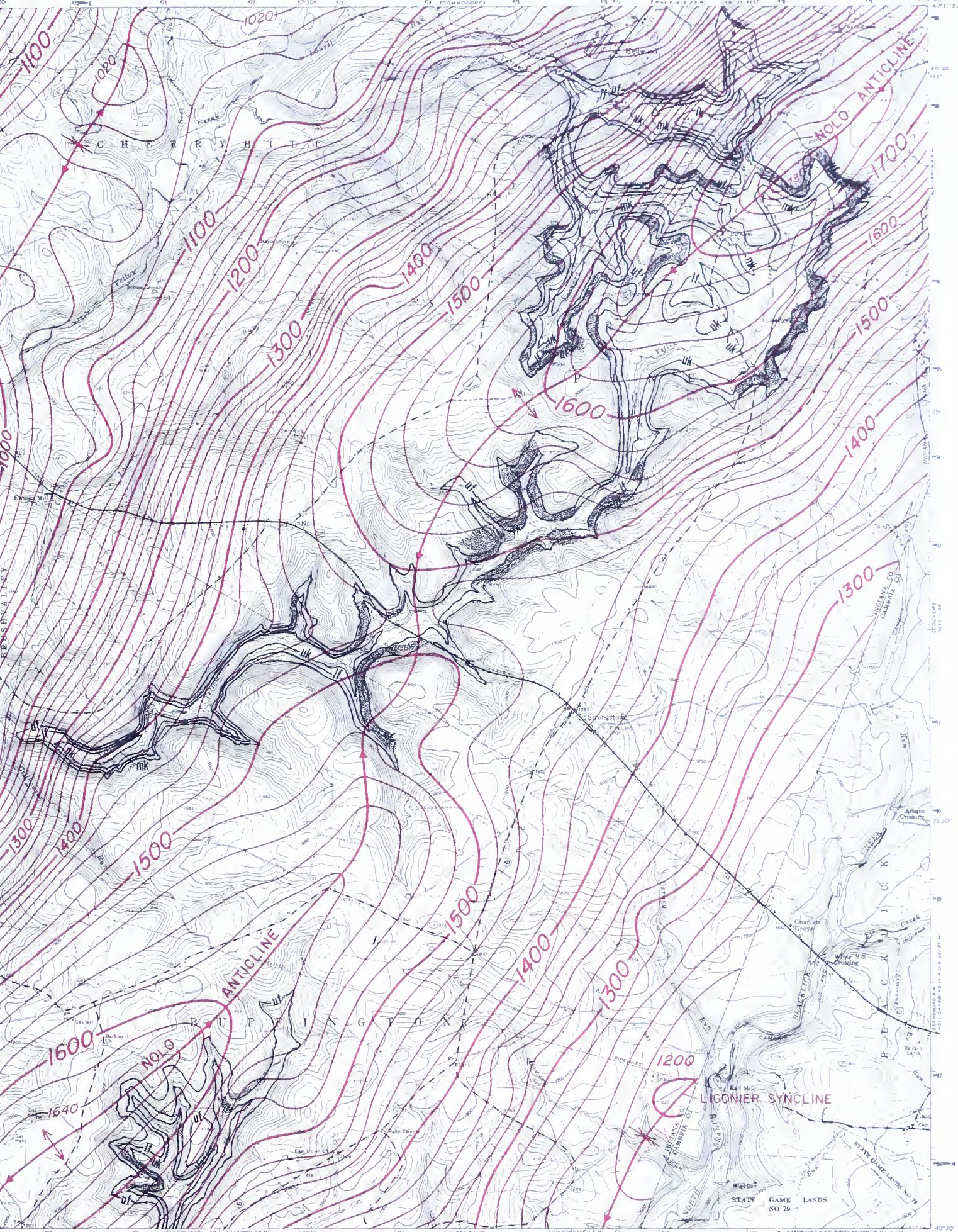
- uf— Upper Freeport coal
- lf— Lower Freeport coal
- uk— Upper Kittanning coal
- mk— Middle Kittanning coal
- lk— Lower Kittanning coal

- Anticline
Showing axial-plane trace and direction of plunge.

- Syncline
Showing axial-plane trace and direction of plunge

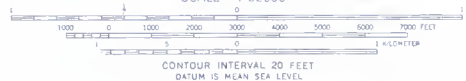
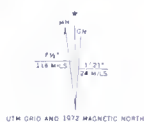
- 1600— Structure contour
Altitude of the base of the Lower Kittanning coal, in feet above mean sea level. Contour interval 20 feet.

- MAP RELIABILITY
- Coal crop lines—good
 - Structure contours—good



SOURCES

Crop lines from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Structure contours modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



- ROAD CLASSIFICATION
- Heavy-duty
 - Medium-duty
 - Light-duty
 - Unimproved dirt
 - U.S. Route
 - State Route

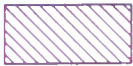


STRONGSTOWN

COAL CROP LINES AND
STRUCTURE CONTOURS

EXPLANATION

Crop line of the
Lower Freeport coal



Extent of known
strip mining



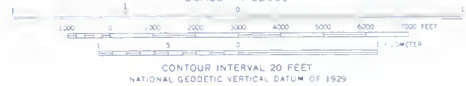
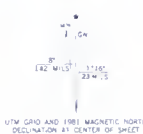
Extent of known
deep mining

MAP RELIABILITY

Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986).



CROP LINE AND MINED-OUT AREAS OF THE
LOWER FREEPORT COAL

VALIER

EXPLANATION

Crop line of the
Upper Freeport coal



Extent of known
strip mining



Extent of known
deep mining

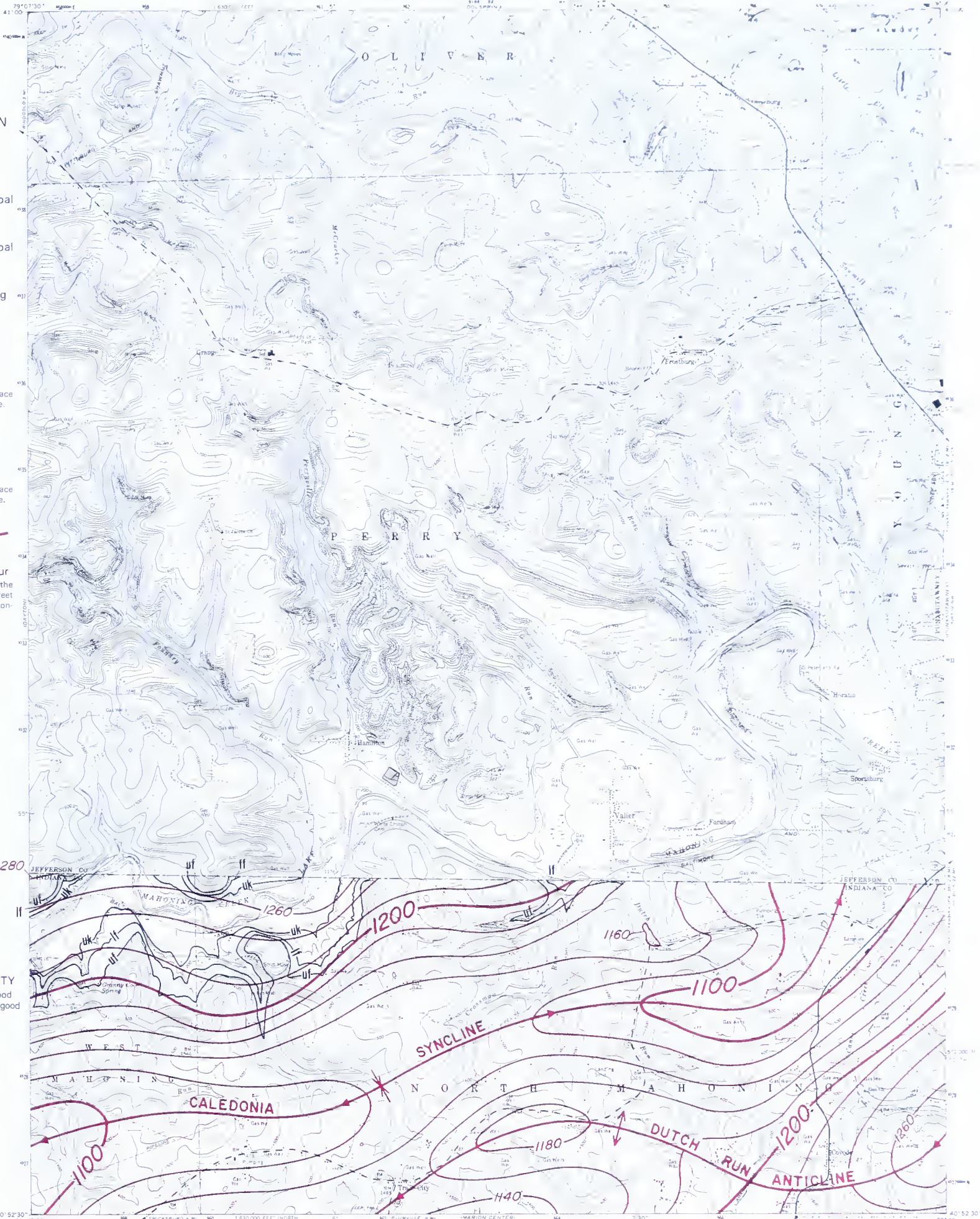
MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate

SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map.
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986).

CROP LINE AND MINED-OUT AREAS OF THE
UPPER FREEPORT COAL





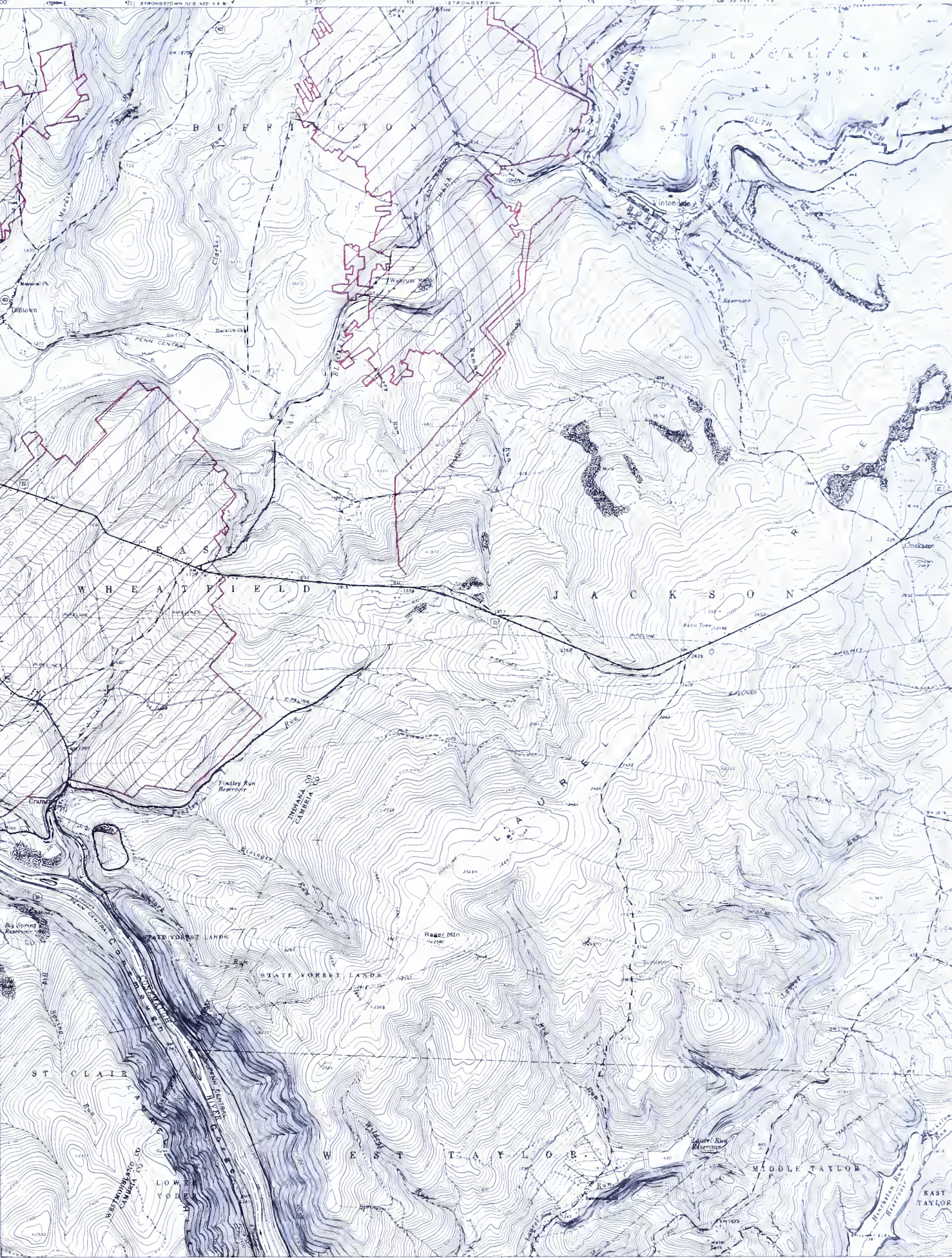
COAL CROP LINES AND STRUCTURE CONTOURS

VALIER

EXPLANATION

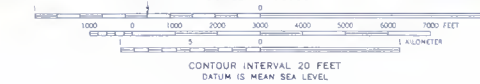
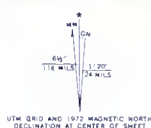
- Crop line of the
Lower Kittanning
coal
- Extent of known
strip mining
- Extent of known
deep mining

MAP RELIABILITY
Coal crop line—good
Limits of known strip
mining—approximate
Limits of known deep
mining—approximate



SOURCES

Crop line from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986).
Limits of strip mining based on interpretation of topographic map.
Limits of deep mining from unpublished map by Bragonier (1986).



ROAD CLASSIFICATION
Heavy-duty Light-duty
Medium-duty Unimproved dirt
U.S. Route State Route



VINTONDALE

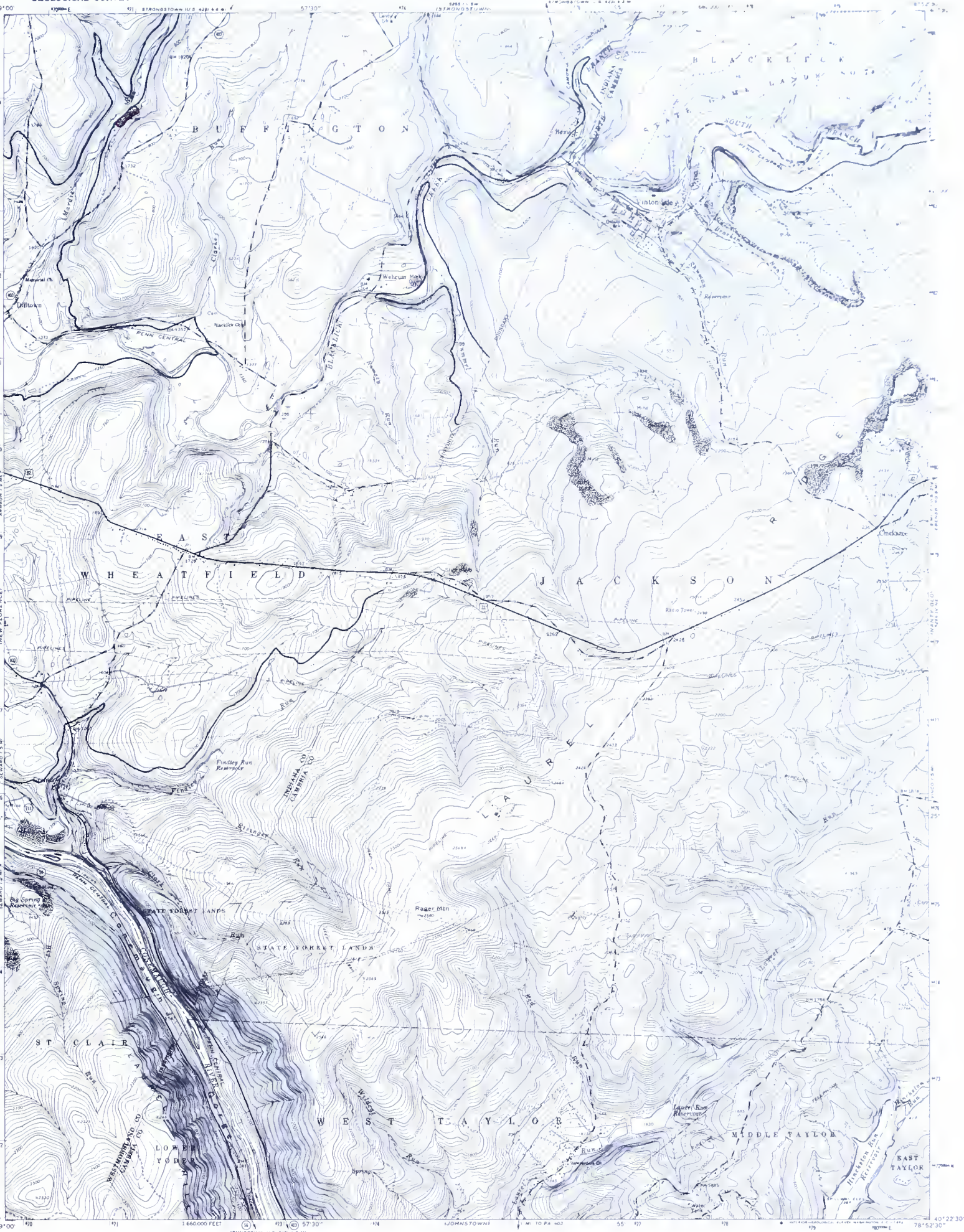
CROP LINE AND MINED-OUT AREAS OF THE
LOWER KITTANNING COAL

EXPLANATION

Crop line of the
Lower Freeport coal

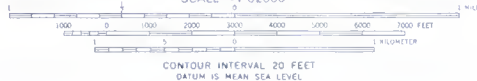
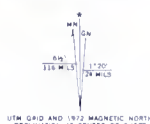
Extent of known
strip mining

MAP RELIABILITY
Coal crop line—fair to
good
Limits of known strip
mining—approximate



SOURCES

Crop line slightly modified by A. D. Glover from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986), based on interpretation of topographic map. Limits of strip mining based on interpretation of topographic map.



CROP LINE AND MINED-OUT AREA OF THE
LOWER FREEPORT COAL

VINTONDALE

EXPLANATION

CROP LINES

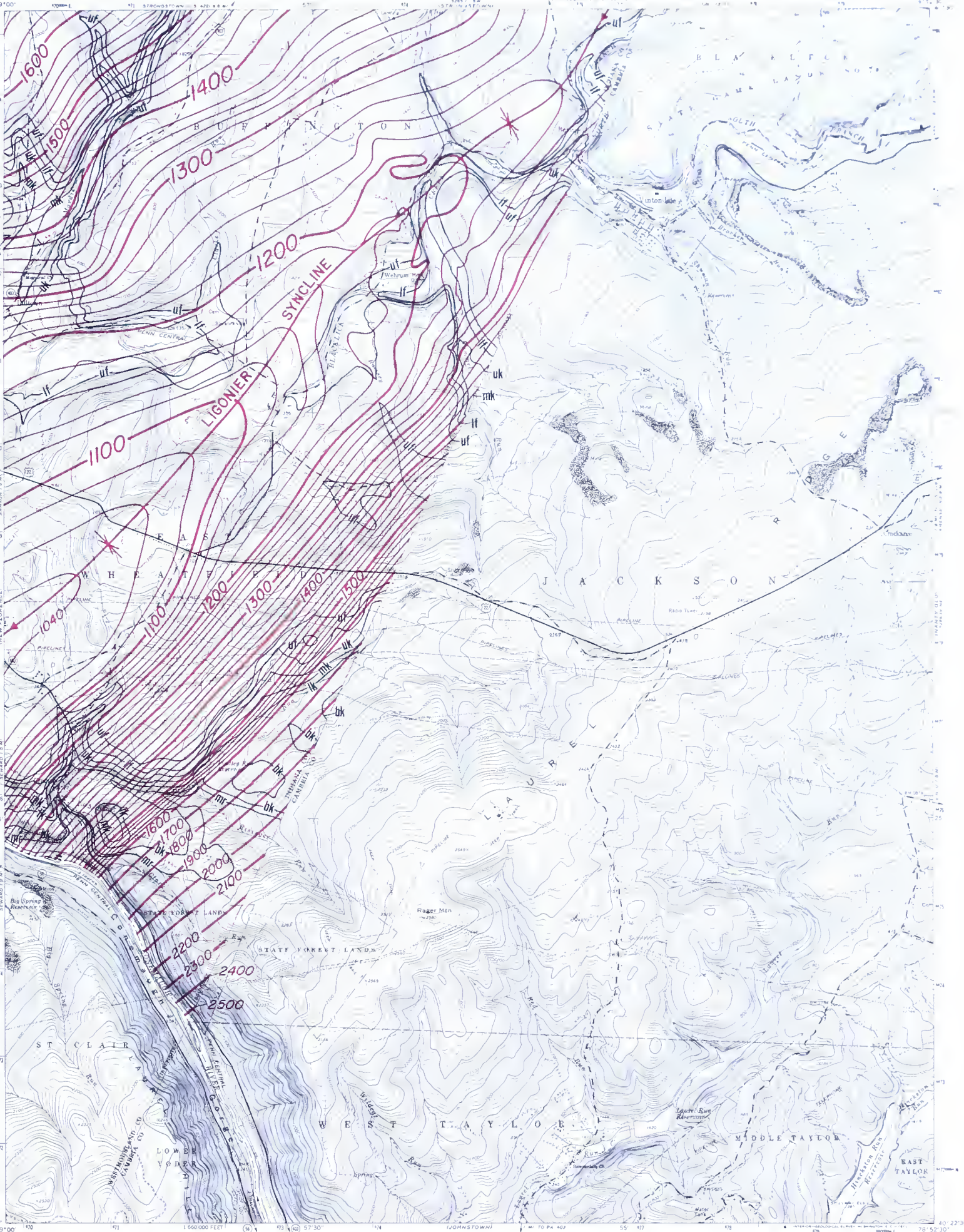
- Upper Freeport coal
- Middle Kittanning coal
- Lower Kittanning coal
- Upper Kittanning coal
- Brookville coal
- Mercer coal

- Syncline
Showing axial-plane trace and direction of plunge.

- Structure contour
Altitude of the base of the Lower Kittanning coal, in feet above mean sea level. Contour intervals 20 and 100 feet.

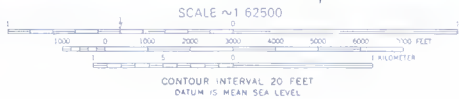
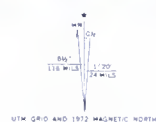
MAP RELIABILITY

- Coal crop lines—fair to good
- Structure contours—fair to good



SOURCES

Crop line of the Lower Kittanning coal from unpublished map by W. A. Bragonier, Rochester and Pittsburgh Coal Company (1986). Crop lines of the Brookville and Mercer coals modified by A. D. Glover from unpublished map by Bragonier (1986) based on interpretation of topographic map. Other crop lines slightly modified by A. D. Glover from unpublished map by Bragonier (1986) based on interpretation of topographic map. Structure contours slightly modified by A. D. Glover from unpublished map by Bragonier (1986) using unpublished data.



- ROAD CLASSIFICATION
- Heavy-duty Light-duty
- Medium-duty Unimproved dirt
- U.S. Route State Route

VINTONDALE

COAL CROP LINES AND STRUCTURE CONTOURS

EXPLANATION

—740—

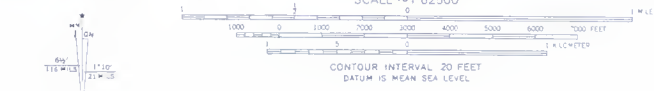
Structure contour
Altitude of the base of the
Lower Kittanning coal, in
feet above mean sea level.
Contour interval 20 feet

MAP RELIABILITY

Structure contours—fair
to good

SOURCES

Structure contours by A. D. Glover based on extension of structure contours in adjacent areas (unpublished maps by W. A. Bragonier, Rochester and Pittsburgh Coal Company [1986], and Skema, V. W. [1988]). *Coal resources of Westmoreland County, Pennsylvania—Part 1. Coal crop lines, mined-out areas, and structure contours*, Pennsylvania Geological Survey, 4th ser., Mineral Resource Report 94, Pt. 1, p. 127).



ROAD CLASSIFICATION	
Heavy-duty	Light-duty
Medium-duty	Unimproved dirt
State Route	

WILPEN

STRUCTURE CONTOURS

